Scientific American.

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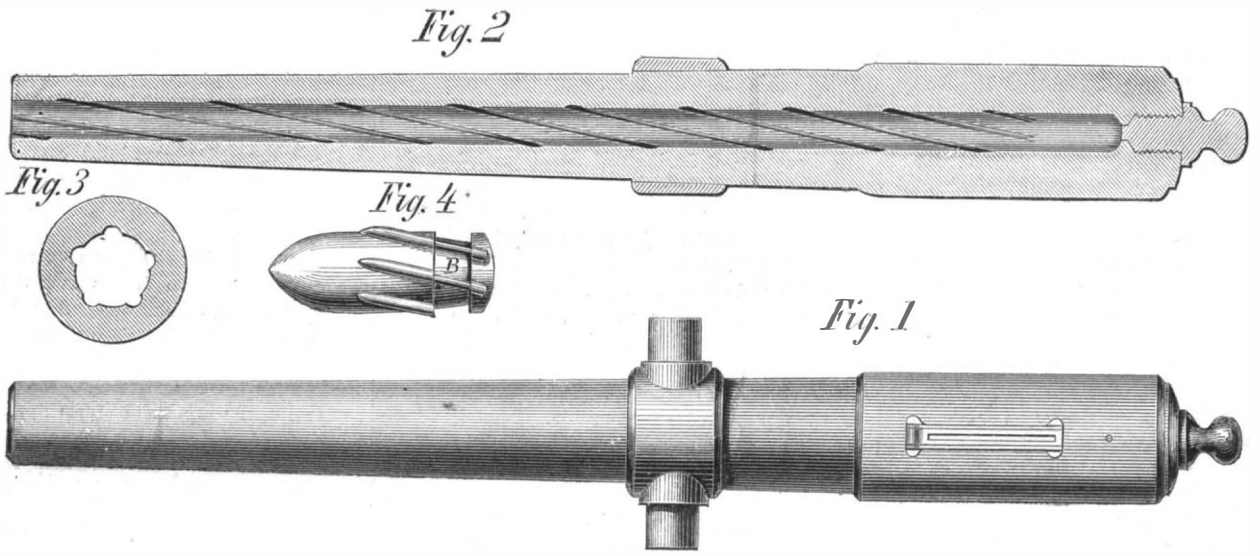
Improved Cannon and Projectiles.

On another page will be found a communication from Mr. Pattison, a civil engineer, pointing out the advantages of puddled steel as a material for cannon, and giving an account of the process of its manufacture. The accompanying engravings illustrate an improved cannon and the projectile for it, both designed and manufactured at the works of Messrs. Corning, Winslow & Co., of Troy, N. Y., the well-known manufacturers of puddled steel.

The peculiar feature of these cannon is principally in the rifling, which is one turn in each forty inches, and the kind of projectile adopted. It will be readily understood by a glance at Figs. 1 and 2, that the trunnions are shrunk on. Fig. 3 represents an enlarged sectional view, showing the bore, and Fig. 4 represents the projectile. The projectile is cast with wings, nearly filling the grooves, and banded with hard prepared leather to prevent windage. The depression at B is ridged to correspond with the wings on the ball, and tapers towards the apex of the cone, so that the leather which is secured with copper rivets while in a moistened state, and subsequently pressed in a warm mold corresponding with the lands, grooves and twist of the rifling, enters very easily. The action of the gas forces the leather band toward the front and necessarily to the larger diameter of the depression, and thus prevents windage. These projectiles answer admirably; in only two instances was the leather cast off during 137 rounds fired at West Point on the 24th and 25th September last. We present a diagram of the target together with Mr. Pattison's report of the firing:—



CORNING, WINSLOW & CO.'S SEMI-STEEL CANNON AND PROJECTILES.

RECORD OF TARGET FIRING WITH CORNING, WINSLOW & CO'S STEEL RIFLED CANNON AT WEST POINT, SEPTEMBER 24 AND 25, 1861.

6-pounder.—Distance to target 1,160 yards.
Size of target 40x20, equal to 800 square feet.
Caliber of cannon 2.32 inches.
Weight of cannon 677 lbs.
Length of cannon 6 feet.
Weight of projectile 6 lbs.
Weight of powder 1-10th weight of projectile.
Elevation 2° 45′.
Total number of rounds 66.
Number of shots in target 51.

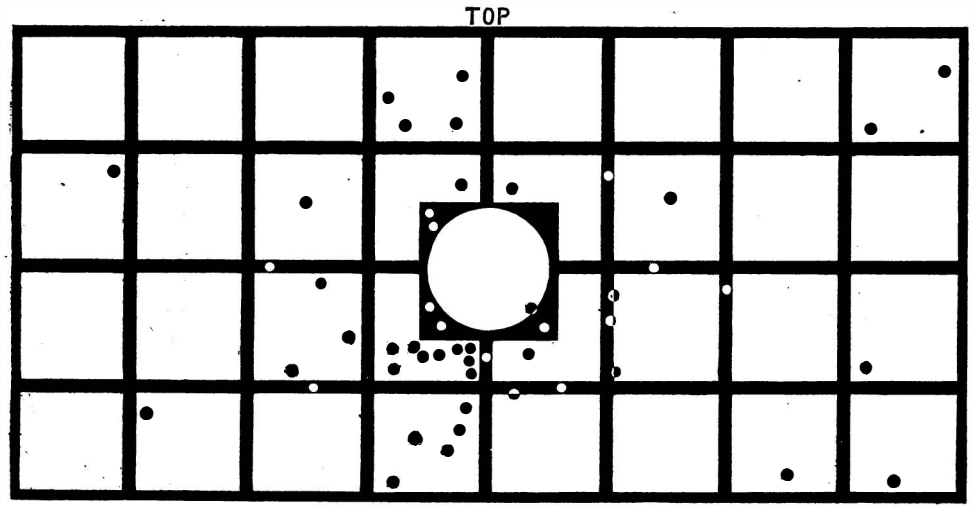
8-pounder.—Distance to target 1,664 yards.
Size of target 15x15, equal to 227 square feet.
Caliber of cannon 2.62 inches.
Weight of cannon 800 lbs.
Length of cannon 6 feet 4 inches.
Weight of projectile 8 lbs.
Weight of powder 1-10th weight of projectile.
Elevation 4° 35′.
Total number of rounds 51.
Number of shots in target 24.

Long Ranges.—Powder 1-8th weight projectile.

6-pounder.—1. 18° elevation ——*
2. 20° elevation 2¼ miles.
3. 23° elevation 2½ miles.

8-pounder.—1. 18° elevation 2¼ miles.
2. 20° elevation 2½ miles.
3. 22½° elevation 3 miles.

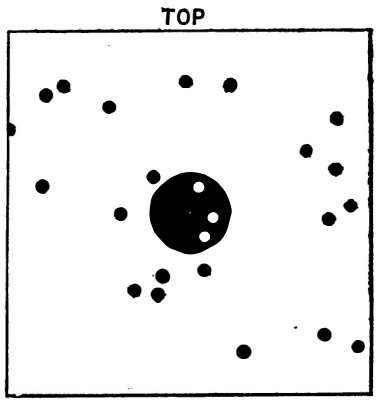
*Not observed by Capt. B——, who kindly stationed himself at Butternut Hill, three miles from the shooting dock.



TARGET 40 BY 20 FEET.

We learn that Messrs. Corning, Winslow & Co. are prepared to furnish ordnance of any ordinary caliber, and of any weight, from 700 lbs. to 5,000 lbs., manufactured from the metal described by Mr. Pattison.

The works of this firm are very extensive, and if, on proper examination and trial, the material should meet the approval of the War Department, the ordnance could be turned out with great rapidity.



TARGET 15 BY 15 FEET.

THE WEALTH OF NEW YORK.—The valuation of all the property in the State of New York, as fixed by the Board of Equalization of Taxes for 1861, is $1,441,767,430. By the census of 1860 the population was 3,851,563, showing the people to be worth $374 apiece in the average.

THERE are 2,607 locomotives in France, and 13,691 other steam engines.

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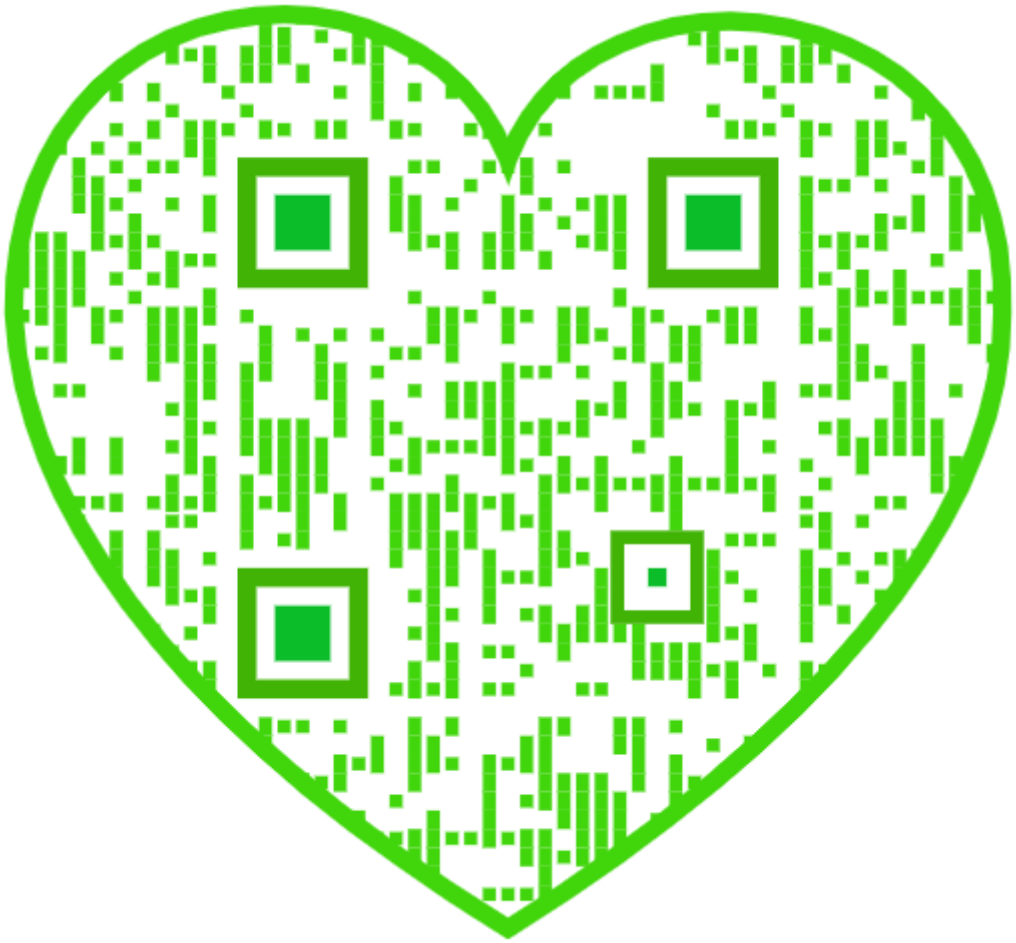

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

Newspaper correspondents are very fond of gossip, and delight in stirring up a sensation. They push these matters so strong at times that the public—generally very gullible—get more than they can possibly take down. It is exceedingly difficult at all times to sift out the real state of facts. A little skirmish between a few picket guards is magnified into a great battle, and the victory is usually claimed on both sides. We have frequently found ourselves very happy one moment over a 64-pound header in the newspapers, announcing a splendid victory—"The Enemy Completely Routed," &c.—and the next moment puzzling ourselves over the details in trying to see just how the victory was achieved. What has troubled us most is to find out just where the glorious victory "came in," when it says that after whipping the enemy our troops fell back or withdrew for want of ammunition, or something of that sort. We are so ignorant of war terms, however, that we probably do not see that when victory is achieved the modest commander announces success in the term "fell back," "withdrew," &c. Our gallant commander, Gen. McClellan, says "No more Bull Runs," so, of course, we are going to whip now every time.

During the past week there has been extraordinary energy in military and naval affairs, and it is quite evident that the crisis is near at hand. We have to record in this summary no less than six engagements, two upon the banks of the Potomac, two in Missouri, one in Kentucky and one near Fortress Monroe. The results of the fights, so far as ascertained, sum up as follow :—

ENGAGEMENTS.

A battle took place on the Upper Potomac on the 21st of October, between Edward's Ferry and Leesburg, Va., which lasted from 9 o'clock in the morning until 8 o'clock in the evening. The forces engaged were the troops of Gen. Stone's division and a large body of the Confederates, said to be from 5,000 to 10,000 strong, under Gen. Evans. The advance of Gen. Stone's army crossed the Potomac in two bodies, one at Edward's Ferry and the other at Harrison's Island, at 9 o'clock, coming in collision with the enemy; a severe skirmish was kept up until 2 o'clock in the afternoon, when the brigades of Gens. Baker (late Senator from Oregon) and Gorman crossed the river and went into action. At five o'clock a large force of the rebels attacked the right wing, commanded by Gen. Baker, who soon fell dead while leading on his men to a charge. Before he fell he dispatched for reinforcements, and Gen. Stone himself came up to the scene of action with a fresh body of troops. He found the right wing in disorder after the death of General Baker, and the left wing made good its retreat in excellent order. Gen. Stone fell back on Harrison's Island, which he now holds, together with all its approaches.

The object of Gen. Stone was to enable his command to unite with Gen. Banks's division to cross the Potomac, which was successful. The latest report is that Gen. Banks's army was successfully crossing the river on the day after the engagement. The death of Gen. Baker is a great loss to the country. He was an able, eloquent and gallant man.

A fight took place on the 16th inst., at Bolivar Hights, Va., just above Harper's Ferry between a force of Confederates, numbering between 2,000 and 3,000, under Col. Ashby and Union troops, consisting of six companies from the Twenty-eighth Pennsylvania, Third Wisconsin, and Thirteenth Massachusetts, under Col. John W. Geary. The fight lasted eight hours, and the Union troops not only repulsed the enemy and held their position, in spite of a tremendous cannonade from flank and front, and well-directed attacks of infantry and cavalry, but drove them by impetuous bayonet charges for three miles, and took a 32-pounder columbiad and considerable ammunition at the point of the bayonet. Gen. Banks, in his dispatch to the government, says :—"Col. Geary's overwhelming defeat of the enemy, outnumbering him six or eight to one, as they did, doubtless grew out of the fact that his position—Bolivar Hights, immediately in the rear of Harper's Ferry—is a remarkably strong one, and the further fact that the infantry of the attacking force were Virginia militia pressed into the service." A large number of Confederates were killed and some prisoners taken. The Union loss was small, owing to the safe position of the troops. Only four men were killed and seven wounded.

Lieut. Martin, commanding Battery K, Ninth Regiment, N. Y. State Militia, in his official report of the fight at Bolivar Hights, says :—"I feel it my duty to mention the different effects produced by the James and Hotchkiss shell before I close. The Hotchkiss was used entirely during that part of the action before the enemy finally retreated. The James was that used in shelling Loudon Hights. The former did not fail in producing the effect desired but once, and that was caused by a failure to explode, and not by any separation of the leaden band from the projectile. The latter (the James) however, in this as well as all other actions at Pritchard's Mills, Berlin and Point of Rocks, at which I have used them, and the results of which I have reported to you heretofore, worked very badly. Of the five shells that I threw at the enemy on Loudon, two failed to explode, and as an instance of what great deviation is caused by the lead flying off from the shell, which is always the case with this projectile, I need only remark that with the same elevation one shell struck half way up the mountain, the other clean over it. The leaden band would sometimes leave the projectile whole, and at others would fly off in small pieces—in one case not ten feet from the gun. You will at once see how little reliance can be placed on these shot and shell." These projectiles have both been illustrated in the Scientific American.

The recapture of Lexington, Mo., is an interesting piece of news recently reported. Major Milpe, of the Missouri volunteers, reports that on the 16th ult., 150 of his regiment, under Major White, surprised the rebel garrison at Lexington, and recaptured the place and all the sick and wounded, together with a quantity of guns, pistols and other articles, which the rebels threw away in their flight. Two pieces of cannon, which were in the fort, were also captured. The rebel garrison numbered 300. The condition of Lexington is represented as deplorable. Portions of the town have been stripped of everything, and many of the inhabitants are actually suffering for the necessaries of life.

It is reported that acting Brigadier-General Wyman, who left Rolla, Mo., several days since with about 2,500 men, had arrived at Lynn Creek, where he dispersed a body of rebels, killing a considerable number, taking over 200 prisoners, and capturing eighteen loads of goods, belonging to McClurg & Co., whom the rebels had robbed; also the sheriff of the county.

Just as we were going to press a telegram reached here *via.* St. Louis, from Pilot Knob, that Col. Plummer's command had routed the secessionists of Thompson and Lowe, estimated at 5,000. Lowe, the rebel leader, was killed, and four heavy guns were captured. The fight took place at Fredrickton, not far from the Iron Mountain.

Intelligence, by courier, reached Cincinnati on the 22d of a fight on the 21st inst. between a large force under Gen. Zollicoffer, secession, and Col. Garrard, Union, at Camp Wildcat. Zollicoffer made three different attacks, and was each time repulsed with considerable loss. The courier met reinforcements of one regiment and artillery on the way to join Col. Garrard.

On the 22d inst. 250 men, of the Massachusetts Battalion, at Fortress Monroe, who were sent out from Newport News to gather fuel, were attacked by Confederates, and stood their ground. The First and Seventh New York Regiments were sent out to support them. At the time the boat left for Old Point no report of the result had been received at Newport News.

The immense naval fleet was at anchor at Hampton roads, awaiting orders to move.

GENERAL SUMMARY.

The report has obtained credence that the steamer *Nashville* ran the blockade at Charleston, having on board James M. Mason, of Virginia, and John Slidell, of Louisiana, bound on a mission to London and Paris. It is stated, also, that they are authorized to place the Southern Confederacy for a limited time under the protection of England and France. Three vessels have gone in pursuit of the *Nashville*, but it is not at all likely that they will effect her capture. She is a fast vessel, and well appointed. The government does not believe the story, but nevertheless gives chase in order to satisfy public anxiety.

The following is a statement of the works, with the extent of their armaments, which constitute the defences of New York :—Fortress at Sandy Hook, 341 guns; Fort Tompkins, 90; Fort Richmond, 140; Fort Hamilton, 118; Fort Lafayette, 76; Battery Hudson, 50; Battery Morton, 9; Redoubt of Fort Hamilton, 26; Redoubt of Fort Tompkins, 26—making a total of 876 guns, 675 of which are heavy guns. These works are located on the Narrows or Atlantic entrance to the city. On the East river are Fort Schuyler, 318 guns, and the fort at Willet's Point, 195 guns. In the harbor of New York are Fort Columbus, 105 guns; South Battery, 14; Castle William, 78; Fort Gibson, 15; Fort Wood, 77. Total, 289 guns.

The bridge-burners are still at work in the Border States. They seem determined to destroy all the property that comes within their reach. The splendid bridge over Green river, in Kentucky, on the line of the Louisville and Nashville Railroad, was burned recently; also, the bridge over the Big river, on the Iron Mountain Railroad, in Missouri, thus cutting off intercourse by rail with Pilot Knob and St. Louis. The bridge was guarded by a company of soldiers, but they could not hold it against Jeff Thompson and his marauding troops.

The whole number of graduates from the West Point Military Academy, from 1802 to 1860, is less than two thousand. This includes the dead, the disabled and those in the rebel service.

It is estimated that 26,000 commissioned officers are required to command the Federal army now in the field. For New York's quota alone 5,000 will hardly suffice.

Report says that the government has decided to push 60,000 Eastern troops into the West at once, one half through Kentucky, and the other into Missouri. These with the Western troops going forward, will swell the Western and Southwestern armies to vast proportions. Out of those pushing on into Missouri another wing will be formed, under a new command, to proceed with the new gun boats and transport steamers down the Mississippi during the autumn months. Gen. Wool, it is thought, will command the river fleet and army.

A Philadelphia paper states that 6,525 muskets, filling 261 cases, have just reached that city, a present from the Prussian government. We are glad to know this and hope there is no mistake about it, but it puzzles us to understand why the Prussian government takes so much interest in Philadelphia. It is certainly a very happy circumstance.

At the Pittsburgh Arsenal a set of boys, who had been employed in making cartridges for the army, became insubordinate, and were very properly dismissed. Since that a number of women have been engaged in the same service, and they do the work better and more expeditiously. We are quite sure that if they were entrusted with the work, there would be no cartridges or shells filled with sand or sawdust, instead powder.

Mr. Seward, Secretary of State, has addressed a letter to Gov. Morgan, urging the importance of placing our forts and harbors on the seas and lakes in a condition of complete defence, so as to be ready for any emergency. Many have felt some alarm in view of this letter of Mr. Seward's, fearing it possible that the government apprehended danger from some foreign power. Mr. Seward, however, states that the prospect of any such disturbance is less serious now than at any other period since the insurrection broke out. As no one can foresee the end of this war, we ought to provide for every contingency.

A government agent has just arrived from New Mexico. He represents the territory quiet, and that the native Mexicans are faithful to the Union, and present a decided contrast to the perjured and treacherous 750 American troops under Col. Loring, who surrendered to a few Texans in Arizona. There are in New Mexico about 1,500 United States troops, who may perhaps, be relied on, besides the native Mexicans, who will do what they can to keep in the Union, if not overwhelmed by a vastly superior Texan force The Indians of the plains, including the Arrapahoes Kioways, Camanches, Utahs and Apaches, are all quiet and friendly. This comes from the judicious distribution of presents this fall.

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The funniest thing published recently is the paragraph about the tone of bullets. Some gay soldier boy says he caught the pitch of a large-sized Minié—it was a swell from E flat to F, and as it passed into the distance and lost its velocity, receded to D—a very pretty change. The boy wisely allowed the "pretty changes" to continue.

Our readers will remember that, not long since, a company of marines, attached to the gulf blockading squadron, entered the bay near the Pensacola Navy Yard, and, after a sharp and dangerous encounter, succeeded in destroying the privateer *Judeth*. Lieut. John H. Russell commanded the enterprise. The Secretary of the Navy has ordered Lieut. Russell to report in person to the department, and he is to be assigned command of one of the new gunboats, as a reward for his gallantry. This is right, and will serve to stimulate our young men in the service to daring action.

About 25,000 horses and 3,000 mules have been received by the Quartermaster in this city since the commencement of the war. On Wednesday there were on hand 1,200 wagons and 133 ambulances—a portion of these being in use and the rest ready for immediate service. On the same day there were 10,144 horses and 27 mules in use, or kept as spare. For the last three weeks the forage master has received 150 tuns of hay and 8,000 bushels of oats per week.

On the 12th of October the following amount of subsistence stores were on hand in the government warehouses at Washington:—Pork, 3,000 bbls.; beef, 6,000 bbls.; beef tongues, 200 bbls.; bacon, 300,000 lbs.; hams, 50,000 lbs.; flour, 11,000 bbls.; hard bread, 3,000,000 lbs.; beans, 4,000 bushels; rice, 1,000 lbs.; hominy, 10,000 lbs.; riced barley, 20,000 lbs.; green coffee, 20,000 lbs.; ground coffee, 40,000 lbs.; tea, 1,000 lbs.; sugar, 2,000,000 lbs.; vinegar, 70,000 gals.; candles, 40,000 lbs; soap, 200,000 lbs.; salt, 40,000 bushels; desiccated potatoes, 2,000 lbs.; desiccated mixed vegetables, 17,000 lbs.; pickels, 278 kegs; dried apples, 50,000 lbs.; split peas, 4,000 bushels; molasses, 6,000 gals.; potatoes, 4,000 bushels. The following shows the prices paid by the government for the specified articles:—Pork, $19 per bbl.; beef, $15 per bbl.; beef tongues, $16 per bbl.; bacon, 10 cents per lb.; hams, 12 cents per lb.; flour, $7.50 per bbl.; hard bread, 4 cents per lb.; beans, $2 per bushel; rice, 7 cents per lb.; hominy, 2½ cents per lb; riced barley, 4½ cents per lb; ground coffee, 20 cents per lb; green coffee, 14 cents per lb.; tea, 50 cents per lb.; sugar, 8½ cents per lb.; vinegar, 12½ cents per gal.; candles, 26 cents per lb.; salt, 6 cents per lb.; desiccated potatoes, 11 cents per lb.; desiccated mixed vegetables, 24 cents per lb.; pickles, $3.75 per keg; dried apples, 5½ cents per lb.; split peas, $2 per bushel; molasses 32 cents per gal.; potatoes, 60 cents per bushel.

It is reported that the government has determined to open the Baltimore and Ohio Railroad from Harper's Ferry to Wheeling, and has detailed Gen. Lander for that service. This noble railway has suffered terribly from the violence of the secessionists. Its bridges have been destroyed; its track torn up, and the rails carted away; its locomotives and cars have been demolished to the extent of hundreds of thousands of dollars.

Gen. Cameron, Secretary of War, has been on a visit to the departments of Missouri and Kentucky, personally inspecting the operations going on within them. He has ordered the work on the St. Louis fortifications to be discontinued for the present. He visited Newport barracks, in Kentucky; also, the fortifications on the hills back of the town. They consits of thirteen redoubts, and are now about complete—the largest being on the Covington and Lexington turnpike, designed for eight large guns and twelve howitzers.

Upward of 3,500 army wagons have been manufactured in Cincinnati since the commencement of the war.

The rebel batteries on the Potomac have rendered the navigation on that river very dangerous. Vessels passing up and down are exposed to a destructive fire.

Mr. Ellett, a prominent military engineer of this city, has proposed to the government a plan for constructing a number of steam rams, with iron beaks, for the protection of the large seaports in the event of a foreign war. It is believed that the government regards this proposition with favor.

Harbors on the Southern Coast.

We subjoin a list of harbors between the mouth of the Chesapeake and Florida, and the distance between each:—

Runs.	Miles.
1. Cape Henry to Oregon Inlet	75
2. Cape Hatteras (thro' Pamlico Sound)	35
3. Hatteras Inlet	10
4. Ocracoke	15 to 20
5. Cedar Inlet	25
6. Cape Lookout	25 to 30
7. Old Topsail Inlet	30 to 35
8. Bogue Inlet	25 to 30
9. New Topsail Inlet	30 to 35
10. Cape Fear	40 to 45
11. Little River	35 to 40
12. Georgetown Light, S. C.	55 to 60
13. Cape Roman	15 to 20
14. Rull Bay	20 to 25
15. Charleston Bay	20 to 25
16. St. Helena Sound	35 to 40
17. Port Royal	15 to 20
18. Savannah River	20 to 30
19. Catharine's Sound	35 to 40
20. Doboy Sound	20 to 30
21. St. Mary's River	30 to 35
22. St. John's River	20
33. St. Augustine	30 to 35
24. Alatanzas Inlet	15 to 20
25. Mosquito Inlet	35
26. Cape Canaveral	40 to 45
27. Indian River	50 to 55
28. Jupiter Inlet	35 to 40
29. Hillsboro Inlet	40 to 45
30. Cape Florida	40 to 50
31. Rogers's Key	40 to 45

This brings a vessel inside the Florida Keys. From this point there is no difficulty in making a harbor every night, or even every few hours.

California at the World's Fair.

A General Committee has been appointed by the various scientific and literary associations of California to make preparations for exhibitors at the World's Fair of 1862 from this great Pacific State. A circular has been issued in which we find the following:—

It is probable that owing to the distracted condition of affairs in the East, little or no preparation will be made by the Atlantic States to occupy a prominent position in the next great Exhibition. The people of the Pacific Coast should consider it their duty to supply this deficiency, as far as in their power, and their exertions should be further stimulated by the fact that their contributions to the Fair which, otherwise and among the more numerous and varied specimens of the skill and industry of the older States might have passed to some extent unnoticed, will now receive their full and deserved share of attention.

This extract does great credit to the enterprise and sagacity of the people of California. The General Committee numbers no less than 114 persons. Each county is represented, and a report will be sent with each article, besides a general report on the mineralogy and geology of California. A room has been provided for articles in San Francisco, under the charge of Royal Fisk, Esq., and arrangements are being made to have all the articles sent to London free of charge. All classes are invited to co-operate in the efforts of the Committee to make that part of the great exhibition, representing California, worthy of general notice and admiration.

More about the Arctic Expedition.

Up to the time of the arrival of the Arctic explorers, two weeks ago, at Halifax, N. S., they had only received news but once in twelve months about American affairs. This was at Uppernavic, in an English newspaper containing President Lincoln's call for the extra session of Congress. The *United States*, the vessel in which Dr. Hayes and his companions went upon their expedition, sailed from Boston July, 1860, and proceeded to Uppernavic and Smith's Straits. In the latter place she remained untily July last, when she started on her return. Being provisioned for a two years' cruise, the cause of the quick return of the expedition has not yet been satisfactorily explained. August Sontag, the astronomer of the expedition, was frozen to death while out with a single Esquimaux on an exploring tour. Dr. Hayes and three men, with dog sleds and boats, went as far north as 81° 35′. The greatest cold experienced was 68° below zero. Two deaths had occurred out of the crew of sixteen persons.

Coating Vessels with Platinum.—It has been found that "platinum black" is fusible in the strong heat of a porcelain furnace. To apply it to porcelain, the platinum black is commingled intimately with turpentine, then painted upon the object to be coated, which is inclosed in a crucible, and burned in a porcelain furnace under an intense heat.

CHEMISTRY OF IRON.

Number I.

CHEMICAL FORMULÆ MADE PLAIN.

On our correspondence page will be found a letter from a young man of extraordinary perseverance and energy, saying that he has made considerable progress in educating himself, greatly to the advantage of his prospects, and is now desirous of extending his knowledge by the study of chemistry. He asks us what work he shall purchase, and we have answered his question. There is, however, one great law which is the key to chemical science, and which it is almost impossible to make plain in a book, but which may be perfectly illustrated by a very simple apparatus that our correspondent can make for himself. This is the law of chemical combination; and as some other of our readers may like to form a clear idea of it in their minds, we will describe in a very few words the manner in which it may be illustrated.

Take a piece of corn stalk pith, or some substance lighter still if one can be found, and cut it into a number of small balls to represent atoms of hydrogen. All the substances in the world are composed of a small number of elements, of which 66 are at present known. These elements are made up of atoms so small as to be invisible, nearly all of the same size, but of various weights. The atom of hydrogen is the lightest of all, and is therefore taken as the standard to compare the weight of other atoms with. The atomic weight of any substance means the number of times that its atom is heavier than the atom of hydrogen. Let each of our pith balls be marked with the initial H, of the atom that they represent. In chemical formulæ H always stands for one atom of hydrogen, H_2 for two atoms, H_3 for three atoms, and so on.

Now take some substance that is sixteen times heavier than corn stalk pith—perhaps oak wood will be found about right—and make a number of balls just half the size of the pith balls to represent oxygen atoms. The atoms of nearly all substances are of the same size as the hydrogen atom, but the oxygen atom is only half the size, while it is a fraction more than eight times as heavy; the atomic weight of oxygen being 8.013. Mark the oxygen atoms O, and then each one of them will be represented by O in chemical formulæ; O meaning one atom of oxygen, O_2 two atoms, O_3 three atoms, and so on. Each one of the 66 known elements is represented in chemical formulæ by the initial of either its English or Latin name.

If our correspondent will take his knife and actually whittle out these little balls as we have directed, we will guarantee that this one short article will be richly worth to him, in his study of chemistry, a year's subscription to the Scientific American. Perhaps we cannot occupy the same space of our paper in a manner more acceptable to a certain number of our readers than in a series of these short articles on elementary chemistry. And as the correspondent for whose especial benefit we write the articles is a worker in iron, we will treat at considerable length of the chemistry of iron and its compounds. This will lead to the discussion of the leading laws and principles of chemistry, and will form as good an introduction to the study of the science as any topic that we could select. Iron, too, is a substance in which as large a number of persons are interested as in any other. All who intend to read the articles will do well to make the little balls to represent the several elements as we come to them in order; for there is no other way in which the whole subject of chemical combination can be made so plain as by this simple apparatus. It was employed by Dalton, the author of the atomic theory, to explain his ideas to the men of science of his day.

The McCormick Reaper Extension Case.

The Commissioner of Patents has refused the application of C. H. McCormick for an extension of his reaper patent, granted Oct. 23, 1847. He admits that the invention is one of great utility and importance to the public, but refuses the extension on the ground that the sums already received by McCormick, and the sums he is entitled to receive from infringements, together, amount to an adequate remuneration, and, therefore, the patent should not be extended.

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Facts about Coal Mining.

The working of coal seams properly is not only an art, but a science requiring great skill, observation and experience to conduct. As coal is to commerce and manufactures what food is to the human body, every fact which extends the boundaries of mining knowledge is to the miner what the science of agriculture is to the farmer. At a late meeting of the South Wales Institute of Engineers, some very useful information on the working of thin seams of coal was presented in a paper read upon the subject by Mr. Handell Cossman, a superintendent of a colliery from which 3,000 tuns are raised weekly, and every seam in it is under three feet thick. He stated that more than 50 per cent of the coal in the mines of England was at present lost by defective mining. Seams of coal from two feet to two and a half feet thick could be worked in Wales for 4s. 6d. per tun for labor, and other items making the total 5s. 10d. Seams from eighteen inches to two feet thick could be worked to yield coal at 6s. 4d. ($1.58) per tun. In South Staffordshire, where the seams of coal were very thick, he had, while on a recent visit to that district, been struck with the fearful danger in working the seams, and with the great waste of coal in mining. He said :—" I do not hesitate to assert that thousands of people have been transported as felons for less crimes than are committed against God and humanity by the reckless and wasteful way in which that wonderful coal field is now being worked. It involves the destruction of no less than 300 lives annually, and over 60 per cent of the coal. One life is sacrificed for every 38,000 tuns of coal raised, while in Somersetshire 150,000 tuns are raised with no greater loss of life."

Mr. Basset, another mining engineer who was present, stated that in the Bristol district very thin seams of coal were worked, and in one colliery in which he was interested, they were now working one only twelve inches in thickness. In these small seams the coal was got out entire with little or no waste, and it was sold for about 10s. and 12s. ($2.80) per tun.

The president, Lionel Brough, Esq., stated that the fearful sacrifice of life in the Staffordshire mines, as had been stated, was too true. Some years ago he had suggested a method of working thick seams of coal by which this great loss of life could be prevented. He had noticed that it was practically impossible to prop up the roof of mines thirty feet high, and it was by the falling of such roofs that the great majority of the pit accidents were caused. To obviate this, his suggestion was that these thick seams should be worked in two slices, dividing the seam into two parts, while working. A lecture upon this subject, which had been published, was once delivered by him, and in one mine where his method had been adopted and practiced for several years not a single life had been lost, nor had an accident occurred.

This is valuable information for American miners who are engaged in working thick coal seams.

India Rubber Varnish.

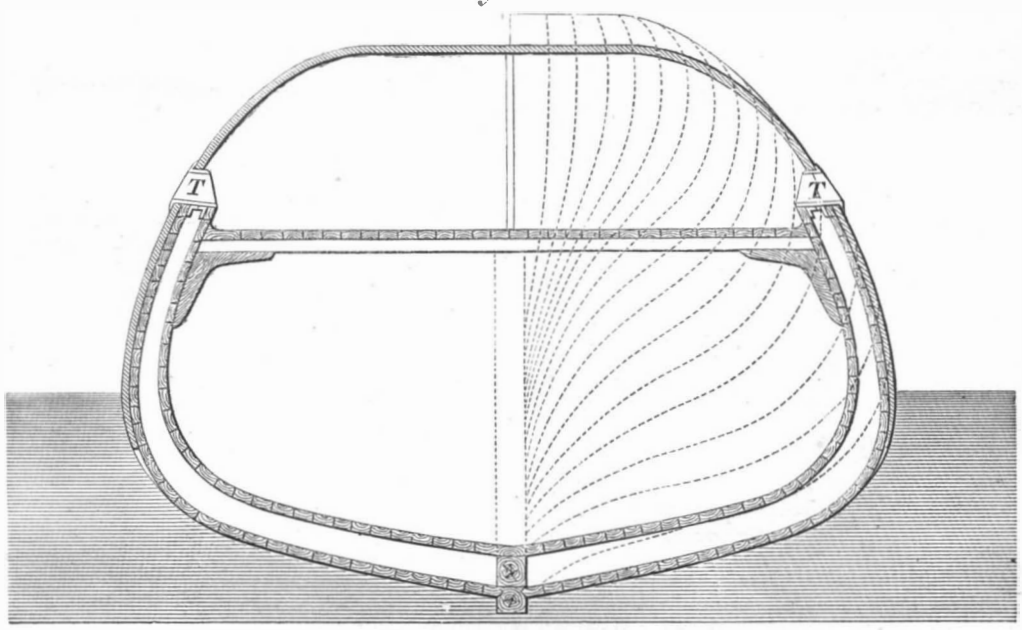
[From Galignani's Messenger.]

That india rubber, dissolved in various liquids, yields a good varnish, is well known ; but in general they are too viscid for delicate purposes, and are only good for making stuffs waterproof. India rubber liquefied by heat, dissolved in oil of coal tar, or drying linseed oil, does not give a varnish of sufficient fluency, or free from smell. Moreover, a considerable quantity of india rubber remains undissolved in a gelatinous state, suspended in the liquid, so that the solution is never clear. Dr. Bolley has recently published some remarks on this subject which may be useful. If india rubber be cut into small pieces and digested in sulphuret of carbon a jelly will be formed ; this must be treated with benzine, and thus a much greater proportion of caoutchouc will be dissolved than would be done by any other method. The liquid must be strained through a woolen cloth, and the sulphuret of carbon be drawn off by evaporation in a water bath ; after which the remaining liquid may be diluted at will with benzine, by which means a transparent, but still yellowish liquid, will be obtained. A more colorless solution may be prepared by digesting india rubber cut into small pieces for many days in benzine, and frequently shaking the bottle which contains it. The jelly thus formed will partly dissolve, yielding a liquid which is thicker than benzine, and may be obtained very clear by filtration and rest. The residue may be separated by straining, and will furnish an excellent water-proof composition. As for the liquid itself, it incorporates easily with all fixed or volatile oils. It dries very fast, and does not shine, unless mixed with resinous varnishes. It is extremely flexible, may be spread in very thin layers, and remain unaltered under the influence of air and light. It may be employed to varnish geographical maps of prints, because it does not affect the whiteness of the paper, does not reflect light disagreeably, as resinous varnishes do, and is not subject to crack or come off in scales. It may be used to fix black chalk or pencil drawings; and unsized paper, when covered with this varnish, may be written on with ink.

Improved Armor for War Ships.

The first engineers of England and France are directing their efforts to devise a better mode of fastening iron-plated armor to ships' sides, experiments having shown that the plates are seriously weakened by having holes drilled through them for bolts. The accompanying engravings illustrate certain improvements in these plates and the mode of securing them-invented by John F. Winslow, of the well-known firm of Corning, Winslow & Co., manufacturers of puddled or semi-steel, at Troy, N. Y. Measures have been taken to obtain a patent on the invention.

Fig. 1



WINSLOW'S BOMB-PROOF ARMOR FOR WAR SHIPS

Fig. 1 represents a midship section, showing the curvature of the vessel at that point as well as the form of the roofing and sides constructed on this improved plan. Fig. 2 represents an enlarged sectional view of the various parts as attached to the hull in a state of completion. Fig. 3 represents a sectional view of the rolled semi-steel plates, E, Fig. 2. Fig. 4 also shows a sectional view of the rolled chair which forms the base for the armor, and rolled to any desired thickness and length not exceeding twenty feet. The chairs may be placed at the option of the engineer eight or more inches apart from center to center, bent to the floor and made to girth the vessel or be laid parallel with the outer planking of the vessel from any desired point below the water line, and fastened to the hull by strong hook-headed bolts, F, about twelve inches apart, passing to the inside of the vessel and then fastened by screws, nuts and washers. The steel plates, E, rolled to any desired thickness, from three-fourths of an inch to four inches, are rolled with flanches, *g*, which interlock with corresponding rolled projections, *a*, on the chair. The intermediate tongue, B, also a rolled portion of the chair, is riveted over contiguous plates, the angles, R, Fig. 3, of which plates are formed in the process of rolling and, when in place, form a countersink, and the V-shaped groove at the extremity of the tongue, B, permits of its being easily laid over and riveted into this countersink. The rib, *h*, on the under side of the steel plates, E, also a rolled portion of the plate, and met by the plate, *x*, is intended to increase the stiffness of the said plate, E. In addition to the rivet security of the plates to the chair, one bolt, J, Fig. 5, in each five lineal feet is introduced with countersunk heads, passing through to the inside of the vessel and secured by nuts, thus leaving a smooth and even surface. The joints, P, or points where the plates and tongues meet, are caulked with cement, and as a support or check to the vibration of the roof formed by the chairs and plates, a row of stancheons is introduced running fore-and-aft the vessel. The hatches and portholes, T, are formed of strong angle iron and pieces of steel plate securely riveted, as shown in the midship section.

Fig. 2

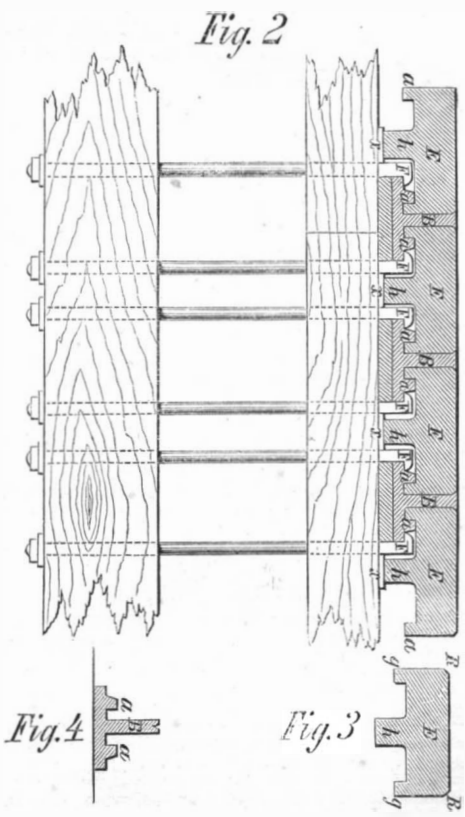


Fig. 4 Fig. 3

The object sought to be accomplished by the invention of this mode of putting on the armor of iron-clad ships, is to obtain a perfectly secure fastening for the outside plates without the use of bolts running to the surface ; these bolts have proved the weak places in the armor of the iron-clad ships in the English and French navies, and much thought, ingenuity and expense are now being directed toward contriving a means of securing the plates to the sides of the vessel without using bolts that come through to the surface ; the few bolts used by Mr. Winslow in his plan, one in each five or six lineal feet, are only introduced to bring the plates firmly down upon the chair, so that the riveting may be easily and securely per-

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formed. When once riveted these few bolts have but little to do in holding the plates to the sides of the ship, and even if taken out, the plates would be quite as secure as with them in place; furthermore, the plan of making this armor and putting it on the ship is vastly less costly than the hammered and planed and tongued and grooved plates upon the *Warrior*, *Black Prince*, *Gloire*, &c. These can all be rolled and so far finished in the rolling mill that nothing is left to be done but to fit them to the sides of the ship. Twelve to fifteen cents per pound is as low as the *Warrior* style of plates can be forged in this country. Add to this four or five cents per pound for planing, tonguing and grooving, before they are taken to the ship, while rolled plates and chairs, upon the above plan, can be rolled, put in readiness for being fitted to the ship at a good deal less than half this price; and if the plates are as thick as those upon the English and French war ships, and securely fastened, why should they not be as impregnable?

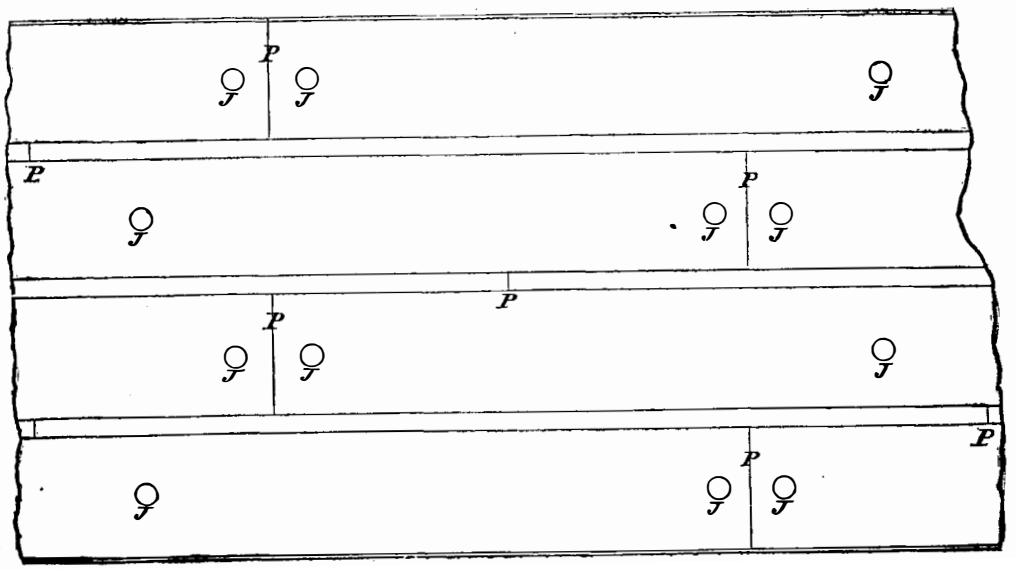
AUTUMNAL TINTS.—No one can maintain, after this year's experience, that frost has any special agency in the autumn coloration of leaves. Scientific men have long understood the matter, and have explained the ripening of the leaf as a simple process of vegetable growth, though the coloration of the leaves at maturity can no more be accounted for than the red of the rose, the blue of the violet, or the orange of the lily. The color which leaves assume in the fall is due to the same causes. But the popular idea that the leaves are changed by the frost is so firmly established in the minds of unscientific and unobservant people that it is difficult to dispel. This year the foliage has assumed the most gorgeous coloring without a sign of frost, and indeed seems to be more brilliant on account of its non-appearance. This is perfectly natural, as the leaves have been able to gradually and freely assume the colors which belong to their ripeness, unobstructed by sudden cold.

EXHIBITION CLOCK.—Her Majesty's Commissioners have not forgotten to make provision for the accurate measurement of time, and Mr. Benson, of Ludgate Hill, London, is now at work upon a clock which will be one of the most striking objects of the Exhibition. It will be erected in the center of the raised platform, near the principal entrance in Cromwell Road. In size and power it will be second only to the great clock at Westminster. The works will be on a level with the sight of the spectator, and will be inclosed in an immense glass case, above which the bells will be suspended. The framework of the movement will be made of iron and gun-metal, and will be nearly ten feet in length. The wheels will be of gun-metal, with steel pinions. Four dials, surmounting the entire structure, will indicate the time to persons within the building, and a clock face, some fifteen feet in diameter, will appear on the exterior, above the principal entrance.

PROCESSES OF MANUFACTURE AT THE EXHIBITION OF 1862.—Besides making arrangements for showing machinery in motion, and illustrating it by processes, her Majesty's Commissioners will reserve space for the exhibition of processes of manufacture in certain handicrafts which can be carried on without danger in the building. They consider that it will be interesting to the general public to have an opportunity of seeing the following and similar processes, and will reserve sufficient space for showing *one* illustration of each of them:—Steel pen making, pin making, needle making, button making, medal striking, gold chain making, engine turning for watches, &c., type casting, type printing by hand, lithographic printing, copper plate printing, earthenware printing, porcelain printing, a potter's wheel, brick and drain tile making, glass blowing on a small scale, turning in metal, wood, and ivory, glove making, &c., pillow lace making of various kinds.

MANUFACTURING AT PITTSBURGH.—The *Chronicle* published in the Iron City, says:—Pittsburgh is herself again! As usual in the summer months, some large works closed, but the iron mills have been in operation for a week or two, the nail factories, with one or two exceptions, were at work yesterday, the glass-works are making headway, and there is a demand for hands which cannot be easily filled, so many having left peaceful avocations to use their muscles in the service of a cause as dear as our religion, and as precious as national liberty and unity. The government

Fig. 5



WINSLOW'S BOMB-PROOF ARMOR---SIDE VIEW..

orders for shot and shell, for cannon and carriges, for saddles, bridles, knapsacks, and cartridge boxes, and other leather work, are sufficient to keep hundreds of toilers busy, and their families comfortable and happy for months yet to come. This is a world of compensations, and such are some, that we, Pittsburghers, have to make us forget the horrors of "grim visaged war."

Planting Chestnut for Fence Trees.

As in many sections of our country suitable timber for fencing has become very scarce, the following advice from the *Country Gentleman* on the subject should now meet with practical acceptance from all our farmers whom it may concern:—

Young, second growth chestnut trees make excellent fencing and other timber, and if, in addition, it be cut in summer (whether with or without regard to the age of the moon, no matter which, it will last a long time). John Johnston, of Geneva, finds second growth chestnut trees best for his fence posts—old trees he regards as of little value.

Chestnut trees on light soil grow very rapidly. Any farmer who has a few acres to spare, may make a very valuable investment by planting a chestnut orchard. The best way to do it is to take a field that is suitable for some cultivated crop corn for example. Plow two or three furrows together into a ridge twelve feet apart, over the whole field, either late in autumn, so as to admit of early planting, or else early in the spring. Plant the chestnuts along this ridge, three or four in a hill, about the same distance as hills of corn. They are difficult to transplant with success, or without check in growth, and, therefore, this mode secures vigorous young plants at once, thinning out all but one in each hill the following year. Plow the spaces between, and plant with corn or potatoes, and cultivate and keep clean the young trees with the rest of the field. If care is taken by using stakes, each hill of chestnuts may be made to stand in a row with the hills of corn, so as to cultivate the whole field both ways. Or, if the corn is planted with a drill, it will not be necessary to take any care in this respect, as the cultivator will run one way only. This cultivation if kept up for a few years, with crops of corn, beans, potatoes, carrots, &c., or with plowed stripes near the trees, and sowed grain between, which is not so good, will give a very rapid start to the young trees; and if they are thinned out in some years, as they crowd, thus giving good stakes, they will, by twenty years, form a very valuable plantation—this being the age found most profitable to cut down the young timber for renewal. A great advantage of this plan is, the wagon used for drawing off the timber may be driven between the rows in a straight, smooth road, and not as in common irregular woods, with constant twists and turns to avoid hitting trees, stumps or roots.

Many fail in raising the chestnut from seed, because they allow the shell of the nut to become dry. Take fresh chestnuts in autumn, and mix them with slightly moist leaf mould, and leave them exposed, out of the reach of mice, all winter. They are best if in contact with the moist ground. Then, as soon as they begin to sprout in spring, plant them two inches deep.

Locust trees may be planted in the same way with corn, but need not be planted before the corn itself, as they will not sprout without scalding; for this reason they are more easily managed. They make admirable timber, when not injured by the insects.

New Kind of Artillery.

An artillery battalion is now organizing at Richmond, Indiana, upon a novel plan. The battalion is to consist of six hundred men, with one hundred guns, the guns to have the capacity of carrying a two-pound ball two and a half miles. A portion of the guns required by the battalion will be made in Richmond. They will have steel barrels rifled, and of very superior workmanship. We do not pretend to any superior military knowledge, but it appears to us that a battalion of this description must be one of the most efficient in battle of any in the world. The guns are light of metal, but of long range, and are to be mounted upon light two-wheeled carriages, each carriage carrying its own ammunition box. Instead of horses, with the trouble and time of hitching and unhitching, the men draw their own gun carriages, which, considering their extreme lightness, is less toilsome than carrying a musket and knapsack. There are six men to each gun, who, in addition, of course, carry pistols and other small arms. It is easy to perceive that in a battle, guns of this description could be handled with wonderful facility and with most deadly effect. Used against infantry or cavalry, a battalion thus formed would be almost as effective as a dozen full batteries of light artillery, the equipment and outfit of which would cost ten times as much as the equipment and outfit of this novel battalion. A plan similar to this was suggested to us last summer by Judge Foot, of Saratoga, and it occurred to us then that artillery of this character would be very effective.

Patent Office Report for 1860.

This work is now nearly ready for distribution, and we hazard little in saying that it will be the finest publication of the kind ever produced at the Patent Office. Through the favor of the contracting engravers, Messrs. Jewett & Co., of Buffalo, N. Y., we have been favored with proof-sheets of engravings intended for the Report, and we are gratified to be able to state that they are done in splendid style, with a fidelity to the original drawings which is really surprising. In addition to the fact that Messrs. Jewett have the reputation of first class artists, we believe that they are also in possession of a secret process for producing engravings for the press, by which cheapness, rapidity and superiority of execution are secured.

We return our thanks to Messrs. Jewett for the several elegant specimens they have sent us.

What they Say of It.

We propose to devote a corner in every number for a few weeks to extracts from some cotemporary whose editor has something to say about the SCIENTIFIC AMERICAN.

We commence with the following from the *Daily Times*, published at Reading, Pa.:—

There are but few newspapers published in this country more deserving of success than the SCIENTIFIC AMERICAN, and as a reliable work of reference for the workshop, manufactory, farm or dwelling, it is unequaled. It is not merely a record of every claim issued by the Patent Office, but contains authentic information relative to every important improvement or advance in science. * * * A few weeks since we were afforded an opportunity of visiting the office of the SCIENTIFIC AMERICAN, and although we were before aware of the immense amount of business transacted by its proprietors, we were astonished to see the extent of accommodation provided for their use.

The office, a large and handsomely furnished room, is so arranged as to accommodate some twenty or thirty examiners of patents, while in the rear is a pleasant room occupied by the editors of the SCIENTIFIC AMERICAN. * *

There are two volumes of the SCIENTIFIC AMERICAN published in a year, and as the price is only $2 per annum, every merchant, mechanic and business man in the country should subscribe. Address Munn & Co., No. 37 Park-row, New York.

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Correspondence

Puddled Steel for Cannon—The Way it is Made.

Messrs. Editors :—The consideration of our means of defence and attack involves questions of pressing importance, to which you have frequently alluded in your invaluable paper. Not least among these are our field and navy ordnance. To these I would now draw your attention.

Almost daily we learn of new guns, new breech-loading cannon and new projectiles, all the projectors of which are equally clamorous to advance their plans as the most perfect and effective ever known. This has been the condition of affairs appertaining to cannon in this country for the past ten months. Notwithstanding, from the seat of war as well as from several States, we still hear the demand for cannon, cannon. This repeated demand remaining unanswered may be accounted for thus : the new inventions—breech-loading cannon and projectiles—do not answer the end.

Perhaps no subject has engrossed more attention or been more keenly and actively discussed, both in this country and in Europe, than that of breech-loading firearms. Not many years ago this kind of arm was not only little regarded, but considered dangerous, and in almost every respect ill adapted for military use. So vast, however, have been the improvements, if we may so term the thousand and one different means or modes of arranging the breech, in this description of ordnance, and so astonishing have been the results in practice, so far as target firing has been concerned, that breech-loading ordnance are now looked upon by many persons (some of them military men) as the perfection of gunnery. This is not to be wondered at when we consider the immense advantage afforded by the breech-loading system, as compared with the tiresome and difficult system of muzzle-loading cannon. At the present moment, when there are a considerable number of breech-loading cannon before the public, and most of them distinguished for great ingenuity in their combination and arrangement ; and as they almost all are entitled to consideration, the selection of a breech-loading cannon for military purposes is a matter requiring the greatest circumspection.

The breech-loading cannon, however, has its drawback ; for, while it is inadequate to the wear and tear of military use, it is moreover incumbered with levers, screws, wedges and joints, which, of all things, are the most objectionable in a military arm, being constantly liable to entanglement with either the carriage or gunner's trappings ; or else some lever, screw or other appliance is almost certain to get disarranged in use or by accident. A military breech-loader must therefore be of the simplest construction, and entirely free from joints, levers, screws ; in fact, everything requiring careful adjustment and delicate handling. These conditions should be made absolute and imperative. This kind of breech-loader is not yet invented ; and since screws, levers and wedges are indispensable as a mechanical means to the end, it is scarcely probable that a perfect breech-loading cannon will be constructed at present.

Mr. Whitworth, who has combined the screw and lever, has come nearest perfection. His mode of rifling—in fact, his gun as a whole—is perfect ; nevertheless, it must be abandoned as an arm for field service from the fact that it is liable to disarrangement from slight accident.

What is required, then, in the absence of a perfect breech-loading cannon, is an effective muzzle-loading cannon, manufactured from a material that will not impair from use, and which, while it does not affect the service of the gun, shall leave the piece light and easy of transportation ; added to this, the projectile must be simple and cheap. These requirements it has been the aim of the constructors to attain in the wrought steel rifled cannon manufactured at the Albany Iron Works, at Troy. The character of the material from which these two pieces of ordnance (illustrations of which I inclose you) are made cannot be too highly recommended for purposes where a high degree of tenacity is necessary.

The treatment of wrought or puddled iron, as well as wrought or puddled steel, for these purposes is a subject so little understood or regarded that a few remarks relative to its treatment may be of use to those unacquainted with it, of which I feel assured there are not a few.

PUDDLING.

This is the title given to one of the most important operations in the manufacture of iron, is generally but little known, and comparatively few operatives perform this important duty in any but an empirical manner.

In its general acceptation, puddling is the art of converting pig iron in a reverberatory furnace into puddled iron or steel. It is, however, performed in several ways, the most general of which is melting gray pig iron in a furnace with an iron bottom and sides in contact with slag of such properties that the metal, after being melted, shall, while suspended in the slag or vitrious cinder bath, be washed, as it were, of its impurities to the degree necessary to make steel, granular or fibrous iron. It is not very long since that steel puddling took an important place in manufactures. Its origin may be said to date from 1845, when puddling gray charcoal iron without being refined was introduced in the valley of the Loire ; from this, steel puddling was only one step, which was made in Germany in 1852. Since that period, however, many supposed different methods of producing puddled steel have been applied. Generally, the beginning must have been made with but slight knowledge of the subject, and many who began empirically have blundered into what is termed "puddled steel making." Some of these have ventured to attribute certain substances, added to pig iron during the process or period of fusion, as the means of producing steel of the best quality ; others attribute success to dimensions of furnaces ; while others advance and still maintain that to temperature at each period of the process, and to this alone, that the production of steel could succeed. In a country where puddling pig iron in slag baths at high temperatures is tolerably well known and understood, a short practice will dispel all this empiricism.

It is a fact pretty generally accepted that wrought iron increases in tenacity in proportion to the manipulation it receives at the forge. Repeated heating and hammering condense and solidify the mass, and the same treatment is necessary to insure a high degree of tenacity in wrought or semi-steel. Cast steel also requires this treatment, but to a much higher degree ; without it it would be worthless for the purposes to which it is applied. Melted as the iron is in crucibles and poured into molds or forms, it must necessarily suggest itself to every reflecting mind that without its being subjected to the action of the hammer it would be little better than cast iron. Thus it is that square or hammered bars of steel are superior to round or rolled bars for tools. It is not a little surprising, therefore, that at this advanced stage in the art of working steel there should be among us those who have ventured to demonstrate (a crude idea they had) that steel could be cast in the form of cannon, ready for the lathe, to be equally as good as though the mass had been repeatedly heated, hammered, condensed and solidified, hence freed from all impurities and rendered homogeneous. A very limited practice must, however, have convinced them of its fallacy.

Probably few gentlemen of the profession in this country have devoted more profound attention to this branch of manufacture than Mr. Winslow, of the firm of Corning, Winslow & Co. Much of the want of success in the arts is the absence of studious habits. It is quite as absurd for the husbandman to expect a harvest where he had not sown the seed as to expect a successful result in the arts without paying the price. This price is merely a close observation of cause and effect, to the total abnegation of hypotheses —an arduous duty, no doubt, when those alone who can bear the most intense heat are considered the best workers in iron.

It is from this puddled or semi-steel, capable of bearing a tensile strain ranging from 90,000 to 118,000 lbs. per square inch, that two rifled cannon have been modeled at their works on what, for various reasons, may be considered an improved plan. The blooms were made from puddled balls welded under one of Nasmith's steam hammers, heated and reheated, hammered and rehammered, until they arrived at the desired form perfectly condensed and refined. I speak advisedly, for I watched the whole process most minutely, and implicitly believe that more exquisite metal than that of which these pieces were manufactured does not exist on this continent, unless it be subsequent forgings furnished the Board of Ordnance on their orders for cannon.

The result, however, has proved satisfactory, and leaves it beyond a doubt that puddled steel can be produced at these works equal in every respect to the European article. Possessing facilities for producing metal the most desirable for cannon in this country, it is a matter of wonder why more of it is not used for ordnance purposes. One of the reasons may probably be traced to the fact that the properties of puddled steel are unknown to those who decide upon the metals of which field and navy ordnance shall be made. A more perfect acquaintance with its merits may remove from the Ordnance Bureau what, at present, is probably doubt augmented by dislike to leave the old and beaten track.

Juan Pattison, C. E.

Troy, N. Y., Oct. 12, 1861.

Water Armor.

Messrs. Editors :—Water, as is well known, is less compressible than either iron or steel, and, although very easily moved, if you will give it proper time, when struck by a body in the most rapid motion, it resists like a solid body. A cannon ball, when fired in a horizontal direction near the water, does not enter it much but rebounds when in its most rapid course as if it had struck a solid body.

Might not water be used instead of steel to protect the sides of a ship against shot? For example, build an iron ship of the usual form, then put a case of boiler iron over the sides of the ship and distant from them four feet, more or less. Connect this case with the sides of the ship by partitions of boiler iron running perpendicularly through the whole depth of the casing, which partitions may be six feet apart, more or less, so as to divide the space between the ship and casing into compartments of six feet, more or less, in length, and of the depth of the casing. The casing must be connected at the bottom with the sides of the ship, at such an angle as may best suit the working of the ship. At the bottom of the casing a pipe with a valve in each compartment, and of sufficient size to allow the compartments to be speedily filled with water, may pass around the sides of the ship. When the water is to be discharged these valves may be opened to allow it to run into the sea. The engine that works the propeller may be used to fill the compartments when necessary. Always, except in action or its near approach, the spaces between the ship and casing will be left empty and may furnish buoyancy enough to sustain the ship even if its bottom should be knocked off, and would keep it securely under all circumstances "right side up."

The ship in its movements, except in action, will not be encumbered with a load like that of the steel or iron plates used for resisting shot, and possibly may be equally safe against shot.

Probably a shot striking against one of the compartments might burst it, but not go through the side of the ship, and the bursting of a few would be attended with no serious damage.

One advantage of this arrangement would be that a ship, when in action, might be sunk almost to the level of the water and present but a small mark to the adversary, and if a shot should penetrate too near the surface of the ocean, the ship might be relieved of her load of water and leave the shot hole harmless.

Again, in passing over bars the ship might take in this load of water to sink her a foot or two beyond her usual depth, and in case she should strike, might easily free herself by discharging the water. Fill an old condemned steam boiler with water, fire a big gun at it, and observe the effect. Experiment.

New York, Oct. 20, 1861.

What Can be Done.

Messrs. Editors :—You will confer a great favor on me by informing me whose works on chemistry you consider the best. I am eager to pursue the study, but I am held back for want of the above information. I will tell you why I am eager to know. I am now twenty-three years of age ; when I was eighteen I did not know how to add one-half and two-thirds

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together; I was a poor boy, wild and reckless; I chanced to get possession of the life of George Stephenson; I gave it a thorough perusal; I made up my mind I would, by the help of God and the energies of man, elevate my position in life, and I have been exceedingly prosperous since that time. I worked seventeen hours and studied three a day, for twelve months; after that I worked from 4½ o'clock in the morning until 5 in the evening, and studied till 12 and 1 at night, for two and a half years. I then got a situation in an iron manufacturing establishment, at a very low salary. My employers were not aware of my determined spirit when they hired me, and now I have complete control of the entire establishment, getting a large salary; the books have to pass my inspection, as well as all other things connected with the business. I am determined to persevere in my studies as long as I live.

Yours, respectfully, H. H.

Pittsburgh, Pa., Oct. 12, 1861.

[What other poor young man is there among our readers who will reflect upon the above simple narrative, and will determine to go and do likewise? The fate of every young man is in his own hands. In reply to the questions of our correspondent, we advise him to get Wells's Chemistry, if he is beginning the study; but if he wants a profound treatise, let him procure Cook's Chemical Physics.—Eds.

Use of Patented Inventions.

Messrs. Editors:—In your remarks upon Patent Law in the Scientific American of October 19th, you quote from an article upon patents in the new "American Cyclopedia," understood to be written by Prof. Parsons, in support of your views upon the moot question: Whether it is lawful to use or sell in one district a patented machine (not an article manufactured with a patented machine) made under a license or partial assignment for another district? The language of the learned professor seems to refer to this question, and it would appear that he meant it so. But the case he refers to for the doctrine does not bear out this language at all. He evidently refers to the case of Boyd *vs.* Brown, 3 McLean's report, page 295, in which the plaintiff claimed a partial right for making bedsteads of a particular construction within the county of Hamilton, Ohio, and the defendant claimed a similar right for the county of Dearborn, in the State of Indiana; the infringement complained of was selling the bedsteads in the county of Hamilton, Ohio. But the bedstead was not the patented machine, but the manufactured article, as appears from the following language of the court:—

> The law protects the *thing patented*, and not the product. The exclusive right to make and use the instruments for the construction of this bedstead in Hamilton county is what the law secures under his assignment to the complainant. Any one violates this right who either makes, uses or sells these *instruments* within the above limits. But the bedstead, which is the product, as soon as it is sold, mingles with the common mass of property, and is only subject to the general laws of property.

And the learned judge puts the case of a patent flouring mill, which is the thing protected, but not the flour manufactured by it, all of which is very plain. But Professor Parsons, in the article in question, seems to ignore this difference, and consequently seems to support your argument, when the case he refers to does not decide it all; but the judge, as will be seen above, rather intimates a contrary opinion; but the question was not before him, and what he says, therefore, is not law. Nor do I intend to express an opinion on that question, but only to correct the loose language of Professor Parsons. C.

Peacock Shooting in India.—This, though an exciting sport, is a dangerous one, the tiger feeling himself suited by the vegetation in which the peacock delights, so that an inexperienced sportsman may suddenly find himself face to face with a tiger, and run a strong chance of being himself the object of pursuit. Old hunters, however, who know the habits of the peacock, find that bird extremely useful in denoting the presence of tigers. When the peacock finds itself in close proximity to a tiger or even a wild cat, it raises the sound of alarm, which is a loud horse cry, answered by those within hearing. The bird then utters a series of sharp, quick grating notes, and gets higher into the trees, so as to be out of the reach of the tiger's claws.

Italian Art and Industry.

A correspondent in the London *Athenæum*, who has attended the Italian Industrial Exhibition, gives this account of the articles displayed by native producers:—The silk growers of Upper Italy appear to bear away the palm from all their rivals in the quality of their raw silk, both white and yellow; and that produced by the Romagna seems the most inferior, both in color, strength and richness. Among the manufactured specimens, the furniture brocades turned out by the looms of Piedmont and Lombardy, and some of those sent from Naples, are of a splendor, both for design and quality, which halts but a little, if at all, behind the manufactures of Lyons. Gold and silver *moire*, and gold-brocaded silks for church vestments, too, are among the most advanced branches of this industry. The linens and damasks for table use, although very far behind what England can show in beauty of finish, are yet in all respects very promising, and have generally in Italy the advantage which a great number of our most plausibly elegant table linen manufacturers have not, of containing no admixture of cotton, and of consequently enduring unfrayed the scrubbing and thumping of several generations of washerwomen, as did the household linen piled in the lavender-scented oak-presses of our grandmothers. Tuscany furnishes a great quantity of the best goods of this kind, as well as all the varieties of toweling, sheeting, &c.; less tempting to look at, but more reasonable and far more durable than ours.

Versatile Naples has contributed products of all kinds to the National Exhibition: pianos, carriages, silks, linens, hemp cloths, and a dozen more kinds of manufactured articles, besides a very beautiful, though not very numerous, display of wrought coral ornaments. Nothing can exceed the elegance of the bracelets, brooches and other ornaments of mixed red and white, or of pale rose-colored coral, worked with infinite taste into knots, posies and cameos of rare delicacy and finish. The Florentine and the Roman mosaics, handsome as they are, look heavy and graceless beside this exquisite manufacture, and one feels quite provoked at the stores of good material wasted in cutting those massive strings of rich flesh-colored coral beads which look too heavy to adorn any throat but that of a Juggernaut idol, when they could be turned into such elegant and becoming trinkets as these.

New Process of Tinning Iron.

To increase the durability of the tin-coating the London *Ironmonger* says:—Messrs. Vivien and Lefevre have devised a process for covering iron vessels with a film of nickel before applying the tin. They begin by scouring the vessels with a mixture of 320 grammes of sulphuric acid and seven litres of water. To this bath they afterward add sixty grammes of kitchen salt, thirty of corrosive sublimate, and ten of pure sulphate of nickel. The vessels having been rotated for a time in this bath are found to have received a fine uninterrupted and very adhering coating of nickel, which effectually protects the iron from oxydation. They are then put into cold water and left there during the preparation of a second bath, which consists of river water fifty litres, cream of tartar, in powder, seventy-five decagrammes, tin, in plates, three kilogrammes. The whole is made to boil for the space of three hours, after which the iron vessels are put in, and the ebullition is continued for two hours more, by which means the vessels receive a coating of tin deposited on the previous one of nickel. They are then dipped into clean water, and rubbed with bran and sawdust to fit them for use.

The Power of Wind Wheels.

Various experiments made with different wind wheels show that the pressure of the air on the wings changes considerably with the velocity of the wind.

The following table gives the pressure of the wind on each square foot of the sails for different velocities;—

	Velocity of the wind per second. Feet.	Pressure in pounds per superficial foot. Pounds.
Low wind	3	0.0409
Do.	6	0.1024
Moderate wind	9	0.2048
Do.	12	0.4096
Do.	15	0.6144
Fresh wind	18	0.8892
Best wind for wind wheels	21	1.2788
Do.	24	1.6384
Good breeze for sailing vessels	27	2.0790
Do.	30	2.5576
Fresh breeze	33	3.1620
Do.	36	3.8912

Mental Labor More Exhausting than Manual.

The Dublin *Agricultural Review* has the following:—To the Rev. Professor Haughton, of Trinity College, Dublin, a philosopher who has enlarged the boundaries of many departments of science, we are indebted for an admirable physiological investigation, the results of which have established the curious fact, that the greatest, or we should, perhaps, say the hardest, thinker is the greatest eater. The Professor asserts that a man who labors neither bodily nor mentally, but who merely lives, will excrete, for every pound of his weight, two grains of urea per diem. Thus, a man weighing 150 lbs., and engaged in no physical or mental employment, will excrete 300 grains of urea. The urea being the products of the complete decomposition of one of the nitrogenous animal tissues, it is necessary that the man should consume a quantity of food capable of yielding an amount of nitrogen equivalent to that contained in 300 organs of urea. This quantity of food suffices, according to the Professor, to keep alive 150 lbs. weight of man, and the work done by the food is termed by the Professor *opus vitale*. In the case of a working man of standard (150lbs.) weight, the amount of motive power developed by him is indicated by the quantity of urea eliminated from his body, which, in the case of hardworking laborers, is about 400 grains. We find, then, that a man employed in manual labor, of an unintellectual character, must employ a quantity of food sufficient, by its decomposition, to yield 400 grains of urea, and of this quantity of aliment three-fourths are expended in keeping the body alive, and the remaining fourth in mechanical work—*opus mechanicum*. A man engaged in mental labor eliminates a quantity of urea varying, according to Professor Haughton's experiments, from 486 grains to 510 grains, clearly proving that mental work causes a much greater waste of tissue than manual labor.

Professor Haughton states that men employed in mere manual routine labor require only a vegetable diet, whilst those who are engaged in pursuits requiring the constant exercise of the intellectual faculties must be supplied with food of a better kind.

Immense Grain Shipment.—Official returns in London show that the imports of wheat and flour to England, during the eight months ending with August reached to the value of twenty millions sterling, ($100,000,000) against seven millions sterling to the same time last year.

The exports of breadstuffs from this country to Europe continue to increase. The shipments from the port of New York on Monday, the 14th ult., being the enormous amount of 332,736 bushels of grain and 23,734 barrels of flour—the greater part of which goes to France. This is probably a larger amount than was ever shipped before from any port in this country in one day. No less than 1,377,546 bushels of grain and 83,524 barrels of flour, worth at a fair estimate $2,225,000, have been exported from this port to Europe during the week ending the 12th October.

New York City Railroads.—In the report of the Inspector of City Railroads it is stated that the Second avenue line has eight miles of road, with seventy-three double cars and fifteen single cars; the Third avenue, eight miles of road, with ninety-six double cars and no single cars; the Fourth avenue, two and three-quarter miles of road, with thirty double cars and no single cars; the Sixth avenue, four miles of road, with forty double cars and twenty single cars; the Eighth avenue, five miles of road, with fifty double cars and eighteen single cars; the Ninth avenue, four miles of road, with six double cars and thirty single cars.

The World's Fair of 1862.—The Commissioners representing the interests of Americans at the World's Fair, have appointed an Executive Committee, consisting of B. P. Johnson, of New York, Chairman; J. C. G. Kennedy, Wm. Seaton, of Washington, and James R. Partridge, of Maryland, the last named Secretary. It is their duty to make all necessary preparatory arrangements for the exhibition. An office is to be established at Washington, and a description of all articles intended for exhibition submitted to the Committee for their action. Inventors or other exhibitors can apply to any one of the Commissioners, or of the Executive Committee.

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ARMSTRONG GUNS AND SMOOTH BORES.

The *Engineer* (London) throws contempt upon the Armstrong gun, and states that the Lords of the Admiralty have concluded, upon sober second thought, that the old 68-pounder smooth bores are an improvement upon anything yet produced. They have supplied thirty-six of such guns for the broadsides of the new iron frigate *Warrior*, instead of 100-pounder Armstrong guns, as had been previously announced. It is not over a year since the wide world resounded with the praise of the Armstrong rifled breech-loading guns, and the English press vauntingly exulted over this arm as being of the most destructive character, giving the British navy and army, furnished with it, superior advantages over all others. The same press is now beginning to howl against this gun, and perhaps with the same indiscrimination which it has formerly displayed in its favor.

The *Engineer* asserts that "few, if any, 4½-inch iron plates have been perforated by Armstrong projectiles, while such plates have been completely riddled with 68-pound solid shot fired from the ordinary 95 cwt. service gun." * * "Whenever," says our cotemporary, "such plates have been peppered by 80-pound shots fired from Sir William's guns, we only hear of indentations, bulges, cracks, &c., but when the 68-pounder smooth bores are brought to bear, we hear of very different results."

For short ranges the smooth bore cannon, with spherical shot, are considered by the *Engineer* superior in destructive effect to rifled cannon and elongated shot. It also states that for large guns it makes comparitively little difference as to range whether the shot is round or elongated. The large American 15-inch gun is commended for attaining as great range with a spherical shot of 425 pounds as the 12-inch gun with a 428-pound elongated shot, the same charges of powder being used for both and at the same elevation.

Lime Light for Lighthouses and Ferry Landings.

A light produced from a stream of oxygen and hydrogen gas burned upon a piece of lime, and sometimes denominated "the calcium" and the "lime light," has been used at one of the ferry landings in Liverpool for two months, and is stated to have operated with great satisfaction. A company has been formed in England for the introduction of this light for general illuminating purposes where lights are required to be seen at great distances, as at the ferry landings of broad rivers and in lighthouses. One of these lights has also been introduced lately into the South Foreland lighthouse on the coast of England, under an agreement of a three months' trial, which, if successful, may lead to its application in all the lighthouses of that country. A Fresnel apparatus with oil lamps, the same as in American lighthouses, has heretofore been used in the South Foreland lighthouse. It has eight panels, and eight lamps were used in it. The lime light is also applied to the Fresnel lens, and its great brilliancy has so astonished the French on the other side of the channel that a number of them have come over to England to examine it. The wicks of lime are operated by clockwork, so as to present a continued fresh surface to the action of the flame.

Campaign Luxuries.

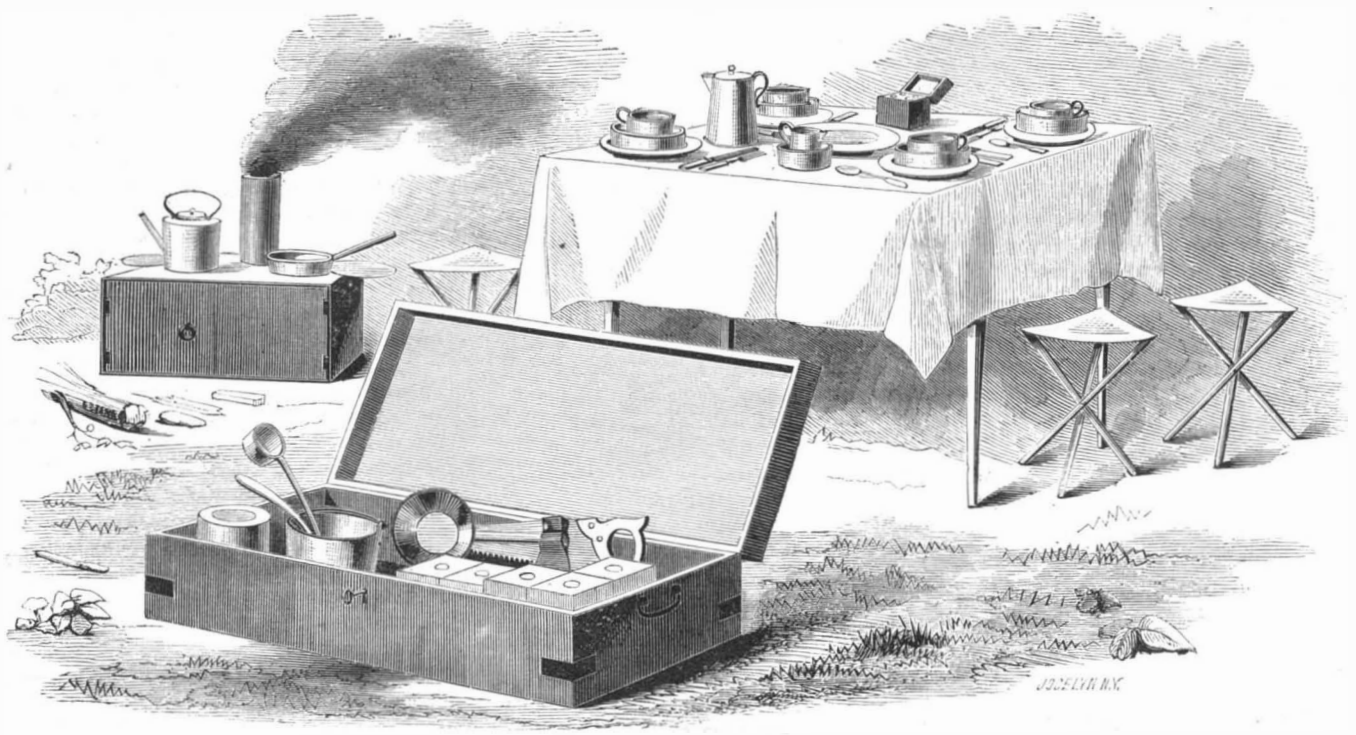
When Louis XV., of France, went to the wars he carried with him a corps of actors and actresses and all the scenery, stage machinery, &c., necessary to furnish him with the amusement of theatrical representations. Even the energetic Duke of Wellington, during his campaign in Spain and Portugal, kept with him a pack of hounds in order that he and his officers might indulge in the sport of fox hunting. Though our colonels can hardly expect to carry among their army baggage either theaters or packs of dogs, our inventors are determined that they shall have all the luxuries which can possibly be compressed into the narrow space permitted in the regulations. We accordingly have applications by the score for improved tents, huts, stoves, drinking cups, &c., though the greatest efforts seem to be directed to the production of a perfect camp chest. The chest here illustrated was invented by J. V. Rockwell, of this city, and its most essential peculiarity is the introduction of a light and convenient cooking stove in addition to the table, dishes, tools, &c. Within the dimensions, when packed, of 31 inches length, 15 inches breadth, and 11 inches depth, are comprised the chest itself, a portable pantry, including all the culinary and mechanical appliances required by a mess of four members—a dining table of 30 by 31 inches spread, durable enough for the roughest usage, and a stove, from its strength and simplicity, especially suited for field cooking. The contents are as follows :—

1 Stove,	1 Table,	1 Iron Spoon,
1 Tea Kettle,	1 Coffee Pot,	4 Knives,
1 Boiler,	1 Sugar Bowl,	4 Forks,
1 Frying Pan,	1 Creamer,	1 pair Carvers,
1 Coffee Canister,	1 Bread Plate,	1 Soup Ladle,
1 Sugar Canister,	1 Meat Dish,	3 Camp Stools,
1 Butter Canister,	4 Dinner Plates,	1 Saw,
1 Liquor Canister,	4 Soup Plates,	1 Hatchet,
1 Milk Canister,	4 Cups,	1 Wash Bowl,
1 Tea Caddy,	4 Table Spoons,	3 Towels,
1 Castor,	4 Tea Spoons,	2 Table Cloths.

The stove and table are so constructed, when folded into shape for packing, as to be adjusted easily to the lid of the chest, adding less than three inches to it in hight. The stove, when folded, is but little larger than an ordinary portfolio, and is packed away without trouble within the folds of the table. Either stove or table can be sold by itself and used conveniently in connection with any camp chest.

Price of the camp chest furnished for four persons, with table and stove, $28; for six persons, $40. Price of table by itself, $5 to $8. Price of stove, $5. Chests with the plates and cups of fine silver-plated ware, small size, $85; large size, $50. Chests, with all the articles for the table of German silver plated, $120 and $160. In addition to the stove, a box of the same material is provided whenever required, at a small extra charge, so arranged as to be attached to the back of the stove, doing the service of an oven, and, when not in use, folding up like the stove. A liberal discount is made to the trade and to regiments purchasing in a body.

Application for a patent for this invention has been made through the Scientific Amercan Patent Agency, and further information in relation to it may be obtained by addressing Messrs. Tiffany & Co., 550 and 552 Broadway, New York.



ROCKWELL'S COMBINATION UNION ARMY CAMP CHEST.

Instantaneous Photography.

The Paris correspondent of the *Photographic News* says :—"Some recently executed instantaneous stereographs of this metropolis, produced by one of your London stereoscopic companies, have been exciting some attention here. They are very fine, and perfectly instantaneous, walking and running figures being impressed on the collodion plate, with foot uplifted, never, in the picture, to be put down. It is somewhat singular that until recently instantaneous photography has not been much practiced here. Until Messrs. Ferrier's recent street scenes, instantaneous pictures of Paris were comparatively unknown. It is somewhat singular in a capital where photographic enterprise, generally, is more active perhaps than in any other part of the world, the initiative in popularizing instantaneous views of its streets should be taken by a foreign firm. I say popularizing, because MM. Ferrier's pictures being transparencies on glass, cannot circulate amongst the people at large, as can these on paper to which I have referred."

Explosion of Heated Metals.—Robert Mushet, in a communication to the *Engineer*, states that by pouring melted pig iron into decorbonized metal, a fearful explosion ensues. "This rash act," he says, "of pouring cast iron into decarbonized metal while air is being forced through it was only once committed, and fortunately only a few hundred pounds of metal were being operated upon. But the whole of the metal was projected, as from a gun, into the air, carrying away the top of the furnace, setting the roof of the lofty cast house on fire, scalding some of the workmen, and nearly terminating the mortal career of Mr. Thomas Brown, who was superintending the operation. It is many degrees more dangerous than setting fire to a magazine of gunpowder."

Coal is sold in South Staffordshire, England, for 5s. 6d. ($1.37) per tun.

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VOL. V. NO. 18.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, NOVEMBER 2, 1861.

FIFTEEN THOUSAND PATENTS SECURED THROUGH OUR AGENCY.

The publishers of this paper have been engaged in procuring patents for the past sixteen years, during which time they have acted as Attorneys for more than FIFTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

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PREPARATIONS FOR FLAX CULTURE.

The manufacturers of flax fabrics in Ireland have not been able to obtain a sufficient supply of flax for several years past. Its cultivation has not kept pace with its manufactures. This has led the linen manufacturers of that country to send agents to Canada this season, and to urge the farmers to engage in the cultivation of this fibrous material. A correspondent of the Canadian *Agriculturalist* states that many of the farmers in Ireland have sold their flax this autumn for about $100 per acre, standing in the field, and from $250 to $500 per tun for fair qualities. These are high prices, and if cotton cannot be obtained to supply the demand for cloth next year, flax will be sought to make up the deficiency, and thus very remunerative prices may be expected by those who engage in its cultivation. We have never seen short flax cotton which could be spun on what is called "cotton machinery," but it may be quite possible to modify the present machinery in cotton factories so as to adapt it for flax spinning, in which case the demand for flax will become great beyond all calculation. We have received a specimen of very good coarse yarn, made chiefly of flax cotton, which was made upon an improved spinning frame, for which a patent was issued to F. S. Stoddard, on the 23d of April last, and assigned to Mr. Edward Coe, of New Haven, Conn. This is an improvement in the right direction, and may lead to most important results in the future manufacture of flax fabrics.

We direct attention to this subject at the present time, as those who intend to engage in cultivating flax as a crop should prepare the soil this fall, if they would attain to success in their efforts. The land best suited for the growth of flax has a clay subsoil and a mellow top soil. It should be grubbed, to destroy weeds, then plowed very deep (trenched if possible) in the fall, so as to mix some of the clay with the active soil. At the same time, although clayey soil produces the heaviest crops, and the best qualities of flax, any good loamy soil will yield remuneratively under proper treatment. The object of deep plowing before winter is to expose the under soil to the action of moisture, air and frost, so as to render it more porous and mellow. It has been the experience of all farmers with stiff soils that plowing in the fall is almost equal to a coating of manure. The reason of this is well known to chemists. Such soils, when rendered porous, always absorb and retain a considerable quantity of that active fertilizer ammonia from rains, snow and the atmosphere. In Ireland, flax is usually sown after wheat, oats or barley, and seldom after root crops. The following is an artificial manure recommended for flax crops by Professor Hodges, of Belfast:—

Muriate of potash	30 lb.
Chlorode of sodium (common salt)	28 lb.
Burned gypsum, powdered	34 lb.
Bone dust	54 lb.
Sulphate of magnesia (epsom salts)	56 lb.

This quantity is sufficient for one acre, and is said to answer a good purpose.

After the winter is past, and the frost and snow have disappeared, and when the ground has become sufficiently dry, the soil which had been previously deep plowed in fall, should be gone over with a fine-toothed harrow and a roller, successively, until the top is as finely pulverized as an onion bed, and the bottom has become somewhat packed, so as to retain considerable moisture, without which the crop will be a failure. When the time for sowing arrives, the land should be marked into ridges, twelve feet wide, to facilitate the sowing and pulling; and the seed at the rate of about twenty-four gallons to the acre, sown and harrowed with a light clover drill, then rolled. If the land be in good condition, this will be an excellent preparation for clover, which is often sown with flax. Unless the soil is cultivated properly, and put into the very best condition, like a seed bed in a garden, a crop of good flax cannot be expected. In efforts which have been made by our American farmers, in the cultivation of fine flax, they have usually failed, on account of not preparing the soil in a suitable manner for the reception of the seed, and, so far as we have observed, in a few special cases, they have used too little seed. It is far better to err in sowing thick than thin, for when the stalks come up from thinly-sowed seed, they grow very rank. Riga flax seed is allowed to be the best, and yields a longer stalk than the American seed, and, whenever it can be obtained it should be preferred; but the native seed also yields very beautiful flax, and, if the foreign quality is too extravagant in price, the native should be preferred.

At the present moment there is a far greater demand in our market for flax than can be supplied. A gentleman interested in the flax business said to us a few days since "a million of acres should be sown with flaxseed next spring; our farmers will find a market for all they can raise."

CRITICISM ON THE ERIE EXPERIMENTS IN WORKING STEAM.

The last number of the *Journal of the Franklin Institute* contains an article by Mr. Samuel McElroy, C. E., criticising the report of the Board of Naval Engineers on the steam experiments made at Erie, Pa., and formerly noticed in our columns. Mr. McElroy says:—

It appears from its report the Board in experimenting adopted a uniform standard of low boiler pressure for all the variations of work and changed the resistances of the wheels by removing the floats. For all grades of expansion, then, low steam was used, a uniform initial pressure and variable resistances. We object to the correctness of this method for the following reasons: The problem which presents itself to an engineer in operating his engine and his boilers is defined by the amount of work to be done and the most economical method of doing it within the limits of safety. And with a given engine in place, like the *Michigan*, the argument between expansion and non-expansion should have been determined by a fixed standard of piston resistance, and not by a fixed standard of boiler pressure with variable resistances. Viewed in this light, which is the only correct one, the mission of this Board was to experiment first on such a boiler pressure as with a full steam stroke would fulfill the usual duties of the engine, and then maintaining the same average cylinder pressure and the same engine duty to test the economical results with successive degrees of expansion and corresponding increments of initial pressure. This is the real matter at issue, whether it is cheaper to carry high steam and expand, or to carry low steam and follow at full stroke.

This places the question of the economy of working steam expansively on a proper basis, and Mr. McElroy is sustained in his position by reliable authors on steam engineering. In order to obtain economy in working steam expansively, the initial pressure should be increased with increased expansion. Two conditions are really necessary to success in working expanded steam. One is increased pressure, and the other is jacketing the cylinder to maintain its heat at the proper temperature. We must remember, however, that the report on the Erie steam experiments on board the United States steamer *Michigan* related to unjacketed cylinders. The First Engineer, who really devoted enthusiastic attention to this subject, was Mr. Arthur Woolf, the inventor of the double cylinder engine, composed of a small cylinder into which the steam was first admitted at very high pressure, and from which it was exhausted into a second cylinder larger than the first, where it operated a piston by expansion. Elijah Galloway, in his "History of the Steam Engine," states that Watt made the discovery that "steam acting with the expansive force of four pounds on the square inch against a safety valve exposed to the atmosphere is capable of expanding itself to four times the volume it then occupies, and still be equal to the pressure of the atmosphere." He also states that Woolf made the discovery that with every increase of pressure the ratio of expansion was nearly uniform. "Steam," he says, "of the expansive force of 20, 30, 40 or 50 pounds on the square inch of a common safety valve will expand to 20, 30, 40 or 50 times its volume. And generally, as to all the intermediate or higher degrees of elastic force, the number of times which steam of a given temperature can expand itself is nearly the same as the number of pounds it is able to sustain on a square inch exposed to the common atmospheric pressure; provided always that the space, place or vessel in which it is allowed to expand itself be of the same temperature as that of the steam before it be allowed room to expand." These conditions are positively necessary to a proper trial for testing the relative economy of using steam at full stroke and cutting off at any part of the stroke. This is a question of deep interest to all engineers, and those of our navy, like all others, have certainly no other interest to secure than the greatest amount of work with the least quantity of fuel. The objections raised against the mode of making experiments at Erie will undoubtedly lead, at no very distant day, to other experiments under different conditions.

SULPHITE OF LIME IN CIDER.

We copied last week from the Boston *Journal* a statement that suphite of lime put into cider would check the fermentation. We had barely room on the page to say that the *Journal's* description of the reactions was incorrect, and as the subject is interesting we will now briefly state what reactions do actually occur.

The sulphite of lime is a combination of sulphurous acid and lime, while sulphuric acid and lime combine to form the sulphate of lime. Sulphurous acid is a combination of one equivalent of sulphur with two of oxygen ($S O_2$), and it has an intense affinity for oxygen, readily combining with one more equivalent to form sulphuric acid ($S O_3$). The fermentation of wine is the process of combination by the atoms of wine with oxygen; but as oxygen—unlike some gentlemen of our acquaintance—prefers sulphurous acid to wine, when sulphurous acid is present in the cask the oxygen combines with it instead of with the wine, and thus the fermentation is arrested. Wine makers are in the practice of burning a little sulphur in the casks to check the fermentation.

Sulphite of lime put into cider has the same effect; and from the same property of sulphurous acid. This acid combines with the oxygen in the cask, becoming sulphuric acid and forming the sulphate of lime.

What we Believe—What we do not Believe—What We Wish.

We believe the SCIENTIFIC AMERICAN is a paper which every mechanic, inventor and manufacturer, throughout the country, would find it his interest to take. We do not believe that for the same amount of money, persons belonging to either of the classes mentioned above can get so much information that is of such practical value to them in their business as they can obtain from the forty-eight columns of reading matter which each number contains. We wish every one of our present subscribers would induce some neighbor or friend to join him in taking the paper.

CAPTAIN BLAKELY, County Down, Ireland, has patented an invention which consists in bringing bars or hoops of steel or iron, to a dull red heat, and in that state, extending or pulling them out in the direction in which the increase of strength is required.

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HISTORY AND ART OF BLEACHING.

A very interesting paper was read upon this subject before the late meeting of the British Scientific Association, by Mr. Henry Ashworth, the substance of which, together with some comments, we herewith present.

The art of bleaching cloth dates from the earliest ages of industrial art. It first commenced in the family, and was accomplished with soap and water, the friction of female hands and exposure to the sun's rays, moisture and the atmosphere. The whitening effect of the sun's rays upon green cloth sprinkled occasionally with soft water is well known to every good housewife. Previously to the middle of the last century the cotton manufacture was scarcely known. Holland was for many years the bleaching house of England. Webs of brown linen used to be sent by English and Irish weavers to Holland to undergo bleaching, and at the end of the *short* space of eight months they were returned finished. In 1749, an improvement took place in bleaching by boiling cotton and linen cloth, first in water containing some slacked lime, then steeping it in an alkaline lye, after which the cloth was washed, then steeped in sour milk, and afterward exposed on the grass to sunshine and moisture, called "crofting," for about ten weeks. An improvement was made upon this process by Dr. Home, of Edinburgh, who substituted dilute sulphuric acid for the sour milk. But the greatest improvement made in the art of modern bleaching is due to M. Scheele, a Swedish chemist, who discovered chlorine in 1787, and used it as a substitute for the exposure of the cloth to the atmosphere. The celebrated French chemist, Berthollett, (who is so well known for his treatise on dyeing) by experiments in his laboratory in Paris, soon afterward more fully developed the virtues of chlorine as a bleaching agent, and to James Watt, the inventor of the steam engine, the chief credit is due for the introduction of chlorine into Great Britain. When on a visit to Paris, Berthollett gave Watt information how to generate chlorine, and he described to him its whitening powers. On his return to Scotland, he generated some of the gas and experimented with it in the Bleaching Works near Glasgow, and he ceased not his labors until they were successful. It has been stated that he was the first person who applied chlorine to the practical arts. This bleaching gas was then generated in long bottles and used in a solution of potash. An improvement was made in 1789, upon this process of obtaining and using the chlorine, by Charles Tennant, of Glasgow, who used a saturated solution of chloride of lime. This invention he secured by patent, but the bleachers and calico-printers of Manchester, England, resisted his patent, on the ground of a flaw in the specification, and they were successful. Subsequently he made the discovery that quick dry lime also absorbed chlorine gas, and this he secured by a carefully drawn up patent, which afterward made him a millionaire. He then commenced the manufacture of chloride of lime, called "bleaching powder," and it was soon used to the exclusion of all other combinations for bleaching, and is so now throughout the world. Chlorine possesses the solvent power of destroying vegetable colors. It is this chemical quality applied to bleaching cotton and linen which has reduced the tedious operations connected with the art from weeks to hours in point of time. And the prices for bleaching have also been reduced in the same ratio, thus benefiting all classes. In 1803, the price charged in Manchester for bleaching and finishing 21 yards of cotton cloth was seven shillings and sixpence (about $1.80), now it is only sixpence (about 12 cents), or one-fifteenth of the price charged fifty-eight years ago.

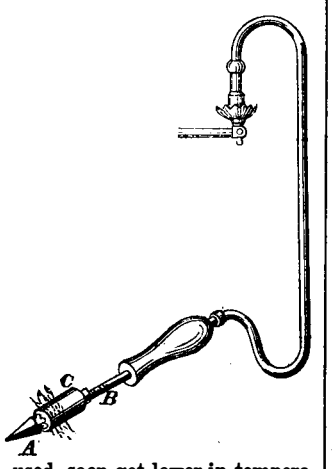
In preparing cloth for bleaching, if it be intended for calico-printing, its surface nap is singed off; if not intended for printing, however, it need not undergo this process. The first operation consists in boiling the cloth for several hours with milk of lime in a "bucking keer," after this it is washed, then run through a dilute *sour* of sulphuric acid and water, then washed and submitted to successive steepings in cold chloride of lime liquor and weak sour until it is quite white. This occupies several days according to the strength of the steeps, but by using warm, strong liquors, it may be bleached white in half an hour. This quick process would not be so favorable for the strength of the fabric. The following is a description of the mode of operations pursued at the Lowell (Mass.) Bleach Works:—1st. The cloth is steeped for about twenty-four hours in tepid water. 2d. It is passed through a bath of milk of lime (fresh slacked lime and water). 3d. Boiled in lime water for six hours. 4th. Washed. 5th. Soured in dilute sulphuric acid at 2° Baume. 6th. Washed. 7th. Boiled for six hours in a solution of carbonate of soda and resin, previously dissolved in alkali. 8th. Washed. 9th. Passed through a clear solution of the chloride of lime marked 1° Baume. 10th. The cloth is exposed folded in the machine in pits with open sides, where it is exposed to the action of carbonic acid and air while it is still saturated with the chloride of lime. 11th. It receives another sour of 2° Baume, then two washings in a machine, and it is ready for drying and finishing. This is the method which is described in the new "American Cyclopedia." In other bleach works in America the process is somewhat different, there being two immersions in chloride of lime and hydro-chloric acid (muriatic acid alias spirit of salt), used in place of sulphuric acid for the sours. The soda and resin solution produces a semi-soap liquor, which forms part of the system patented some years since by Mr. Higgins, of Manchester, England.

In the mechanical and manual operations of bleaching as great a revolution has been effected as in the chemical actions and processes. In the days of grass bleaching, the crofters—men and women—were constantly exposed to moisture in wheeling wet pieces of cloth on barrows, and carrying them on their shoulders to the grass fields. They were seldom dry, and during the cold days of winter their clothes were frequently frozen on their persons. The life of the field hands was then a wearisome drudgery, and their wages were exceedingly low. Machinery has now taken the place of most of the hand labor; there is no more outdoor work in wet weather; the labor is now light and the pay much higher. In England, Mr. Ashworth states, that the staple food of the bleacher was formerly oatmeal, and animal food, with the exception of bacon, was seldom found at their tables. The times have changed for the better. Processes and machinery have been improved; toil is made more healthy and comfortable, and the social condition of the operatives has advanced in an equal degree. "Their tables are now spread with wheaten bread, animal food, and all the other articles which usually enter into the consumption of families in the other grades of life."

In the finishing operations of bleached cloth there is great rivalry among the different establishments in England, and to such an extent has this competition been carried that "the machinery, skill and cost of extraneous materials required have occasioned an expenditure that is said to exceed all the other expenses in bleaching." In America there is but little rivalry of this sort, and out of France, Scotland and Switzerland, the finishing of the finer fabrics (such as muslins) of bleached cotton cloth is but little understood and practiced.

SOLDERING IRON HEATED WITH GAS.

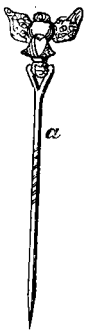
A common soldering tool is made with a wooden handle and an iron shank, on the end of which is secured a pyramidically-shaped block of copper that is tinned on the surface and misnamed the soldering iron. When used by tinsmiths or others it is usually heated in a clear charcoal fire, and when raised to the proper temperature is applied to melt solder and run it into seams of metallic articles, so as to close them hermetically. Such tools, when being used, soon get lower in temperature than the melting point of solder; they, therefore, require frequent reheating, and if permitted to remain too long in the fire the tin will run off their surfaces, in which case they cannot be used until retinned.



The accompanying engraving represents a soldering tool secured to the extremity of a flexible pendant gas tube. Its handle is hollow, and is composed of wood or any non-conducting substance. The shank, B, is a tubular screw, inserted in the small gas cylinder, C, to which the copper soldering piece, A, having a chamber in its base, is secured. The gas issues in jets from the cylinder, C, which has apertures in it, and the flame keeps the tool always heated to the proper degree of temperature. Another advantage consists in the light which the jet of flame throws upon the article requiring soldering. This is important when using the tool in the inside of hollow articles. Patented by Abner Burbanks, Brooklyn, July 14, 1860. Assignee, Geo. H. Burbanks, Rochester, N. Y.

CONVENIENT DEVICE FOR ARTICLES OF JEWELRY.

The common bosom pin is made with its ornamental head permanently secured to and forming a single united piece with the shank or pin. The annexed figure represents a convenient device by which a variety of ornamental heads may be used with the same pin, so as to obtain a number of characteristic forms to suit the dress for particular occasions. The pin, *a*, is formed with a conical open top to receive and clasp the ornament, as represented. The base of the ornament is shaped to coincide with the conical space which receives it. Any desired number of ornamental heads may be used with this pin, and each may be made double, with a different figure on each side, to be exchanged from front to rear, and *vice versa*.



Patented Jan. 3, 1860, by Jean Jaques Huber, of Geneva, Switzerland.

Business Reviving—Money Plenty—A Better Investment than Treasury Notes.

Business of nearly all kinds is fast recovering from the first depressing effects of our war, and the disbursement among our people of nearly a million of dollars a day from the National Treasury, is making money plenty throughout the Northern, Eastern and Western States. Manufacturers, mechanics and artisans are generally busy, and are earning more than usual. We are going to propose to such of these classes as have not already made the investment, a way to invest a very small portion of their income by which they will receive their interest every week, and obtain a better percentage than even in buying Treasury Notes.

At No. 37 Park Row, in the city of New York, there is published on Saturday of every week a very handsome illustrated paper devoted to manufactures, mechanics, chemistry and, indeed, the whole range of the arts and sciences. It is printed on a superior quality of white paper, manufactured expressly for the publication. Every number contains sixteen pages or forty-eight columns of useful reading matter, including several engravings of the latest and best inventions, all of which are executed in the highest style of the art expressly for the publication referred to. There is no other paper of the kind published in this country, and for the manufacturer, mechanic and inventor there is no other paper so well adapted to their wants. The subscription price is only $2 a year or $1 for six months. It is only from the large number printed that it is furnished so cheaply. Inferior weekly publications in England, of a similar class, are issued at $5 per annum.

The modesty of the publishers forbids our giving the name of the publication; but the reader may rely upon its being the oldest, cheapest and the best mechanical paper ever issued in this country, and the only one of its kind now published. Every mechanic, inventor or manufacturer who is not a patron of the Scientific American should send $2 to the address of Munn & & Co., 37 Park Row, New York, and he will immediately begin to get a return from his investment by receiving a copy of the paper we have described, which he will continue to receive regularly every week for one year.

Late news from the Old World recounts the death of that tigress, the Queen of Madagascar. Her son is now king, and he is said to be humane and intelligent.

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How Straw Paper is Made.

[From the Philadelphia Press.]

The art of manufacturing paper of straw has made rapid progress since its discovery. The paper was first made in this city in 1854. Although of a dingy yellow hue, harsh and brittle to the touch, and scarcely to be handled without tearing, its production was deemed the marvel of the age (as, indeed, it was), and the very least of the many glorious auguries of it was, that it should entirely revolutionize the newspaper business in time. In those days the straw was most unscientifically boiled in open tubs, and consequently it was never perfectly freed of its silica; and being silicated it was found almost impossible to wet it down for presswork, so that the paper was either too much printed, or not printed at all, and a growl went up from the reading public, of alarm and indignation.

Under various mitigated forms, the evil, nevertheless, continued for years, and the growls grew fainter and fainter as the people's eyes and perverted tastes became accustomed to it.

About eighteen months ago letters patent were secured for various important modifications of the original process. The method of making straw paper is as follows:—

The straw is first passed into a cutter, whereby it is reduced to lengths of from three to four inches. It is then thrown into large vats, and thoroughly saturated with weak alkali. A most unpleasant odor hence arises, somewhat similar to that perceptible in all large breweries, but we are informed that it is not prejudicial to the health of the workmen. This operation of mixing is termed "breaking down," and changes the straw in color to a dark biske. It is next filled into large air-tight boilers, fourteen feet in diameter, subjected to a pressure of steam ninety pounds to the square inch, and boiled in another alkali. Each of these boilers will contain eleven thousand pounds of broken straw. It is then ground into pulp, in the same method and by the same machinery that have hitherto been employed in the manufacture of rag paper. It has now been changed to a very dark slate color, and it would be difficult for us to recognize in it any element of the bright yellow straw of an hour since, if we were not previously acquainted with the marvelous nature of the transformation. After this it passes into a series of vats, where, by means of certain bleaching powders, it is brought to a hue of snowy whiteness and reduced to a proper consistency by water. The mass now bears much resemblance to plaster-of-paris in solution, and is ready to be worked up into paper.

The most interesting process yet remains to be described, but we must pass into another apartment to witness it. At the eastern extremity of the room is a sort of trough, into which the pulpy liquor is pumped by steam power, and from which it flows upon a horizontal sieve of very fine copper wire. The fibers of the pulp at once arrange themselves on this sieve. A species of film is thus formed, which though not a hundredth of an inch in thickness and largely saturated with water, has sufficient body to answer every purpose. It is next made to pass between a series of wooden rollers, which gradually consolidate and compress its fibers and free it of all the surplus water. By means of heated rollers, through which it is caused to pass, every particle of moisture is at length removed, and it is calendered by being pressed between heavy, polished iron rollers. The positions of two small revolving wheels, with cutting surfaces, between which it is caused to move, regulate its width as required, and it is finally wound upon reels, from which it may be cut off into sheets of any length.

The entire operation is so simple that the visitor who has an opportunity of inspecting it cannot fail to comprehend it almost instantly. The machinery, nevertheless, requires to be of exceeding accuracy, and is accordingly rather expensive. Its capacity admits of the production of 9,000 pounds of paper per day, but only about three-fourths of that amount is at present manufactured, or between 180,000 and 190,000 pounds per month. Two thousand tuns of straw are yearly consumed here in the manufacture of paper. But forty per cent of this, however, is available as fiber. The balance passes off into glutinous matter and silica, neither of which being convertible into dollars and cents and represents an appreciable value. This immense waste in the raw material is, however, fully compensated for in the advantages of the product. Compared with paper made from rags, straw paper has more body for the same weight, is better adapted for fast presscs, and it will not readily tear, and calenders much more smoothly. As to whether it can be produced at a cheaper rate, we shall not take it upon ourselves to state. There are probably not over half a dozen factories in the United States engaged in making it. Two or three of them are situated in New York, and another in Cincinnati. There is but one newspaper establishment in Philadelphia which uses straw paper for printing purposes.

The Conditions of Life.

It is hard to know whether more to admire the variety of the forms under which food is supplied to the animal creation or the simplicity of the fundamental plan. The number of nutritious substances baffles calculation, and embraces the utmost diversity of kinds, adapted to every variety of climate, circumstance or habit. While the living organism, on the one hand, can build up a solid frame from liquid materials, on the other, it can pour iron through its veins, and reduce the hardest textures into blood. There is a squirrel in Africa that feeds on elephant's tusks; and the mark of his teeth is a welcome sight to the ivory-collector. The cunning creature selects —for there is scope for epicurism even in this hard fare—the tusks which are richest in animal matter, and which are, therefore, the most valuable. But under what diversity of form it may be presented, food is in its essential nature always the same. To give us active bodies, it must be an active substance; that is, it must consist of elements which tend to change through the operation of their chemical affinities. To furnish food for animal life is in one aspect a simple problem, though wrought out in infinite complexity. It is to provide matter in unstable equilibrium, as it is said, or constantly tending to assume new forms, like waves raised in water by the wind. Yet it must not be utterly incapable of retaining its existing form, but should be delicately balanced, as it were, so that it will admit of being transferred and molded in various ways, unaltered, and yet will undergo change immediately when certain conditions are fulfilled. Given a substance thus composed, and there is food. For we must not limit our ideas here to that which happens to be food for us, or for the creatures likest to ourselves. Food is found by some creature or other in circumstances the most widely diverse. There is hardly a poison known that does not afford sustenance to some form of life. Corrosive minerals in solution afford nutriment to peculiar kinds of mold or cell plants. Even the gastric juice—the "universal solvent"—will sustain, without losing its properties, its special fungus. The fable of Mithridates, who accustomed himself to eat all deadly things with impunity, is more than realized in nature. Life in its widest sense almost refuses to recognize a poison. What is death to one organism supports another. Thus many diseases—an ever-increasing number of them indeed—are found to consist in the development of parasites; a new and hostile life invading the old, and flourishing in its destruction. And some of the most virulent vegetable poisons differ but slightly in composition from perfectly wholesome substances.—*Cornhill Magazine.*

A Microscopic Age.

A correspondent of the *St. James's Magazine* says:—"If I were to point out what is the most striking characteristic of the present century, I do not think that I should dwell upon it as a scientific age, or as a commercial age, or as a mechanical age, or as a literary age, or as a missionary age (by all which epithets it has been described), but as a microscopic age. Nothing appears to be so wonderful as the change which has occurred in the common doctrine of magnitudes. Little things have become great and great things have become small. As the modern science of chemistry could not spring into existence until an accurate balance was invented, so the modern science of physiology and the whole theory of mortal life, as we now comprehend it, has grown out of the microscope. This is a literal fact, and it is symbolic of a much wider one,—that all modern research has become microscopic. Painting has become miroscopic, and gives us details of mosses and lichens, which a half century ago would be laughed at as a useless waste of time. History has become microscopic, and enlivens the descriptions of courts and senates with a minute account of carpet and cakes, dresses, dinners, and other trivialities. Poetry has become microscopic and tells us that the meanest flower that breathes can give to the bard thoughts that do lie too deep for tears."

A Physiological Phenomenon.

The Stockton *Independent* says that a very marvelous illustration of the power which one man can exercise over another may be seen at the asylum for the insane in Stockton. A Mexican, of vigorous physical organization, and possessing those basilisk eyes so admirably described in Holmes's story of "Elsie Verner," has charmed a German inmate, whom he has under such absolute submission to his will, that not a step, attitude or motion taken by the Mexican is escaped by the German. The Mexican is always about half a step in advance of the German. If the former raises his hands, or moves his arms, or changes the position of his body, the latter, without turning his head or eyes, instantly assumes the same position; if the former advances, the latter follows; if he seats himself, so does the German; if he washes, or dines, or lolls, or lies down, every action and motion is silently imitated; and, we are informed by the keeper, that this kind of drill has been kept up for four months past, and is carried out through every minutiæ of daily life. If they are separated by the interference of the keeper the German becomes highly enraged, but is pacified as soon as they are again brought together. What is most curious about the connection, the Mexican never looks at or speaks to his victim, who silently follows him as faithful as his shadow. Before the German followed him, an Irishman was under the same hallucination, until he became cured of his insanity and was discharged.

Searching for Coal in Egypt.

Mr. John Petherick, with reference to a late search for coal in the delta of the Nile, states that about thirteen miles from Cairo, he examined a deep pit, and found it had been sunk in a calcareous formation, intersected with beds of marl to the depth of 266 yards, from 100 feet below the bed of the Nile. He, therefore, concluded that there was just as much probability of finding coal on the top of the pyramids as there. He returned to Shubra and reported to the Viceroy, whom he found playing at cards with three comfortable looking old Turks. When he entered the playing ceased, and the Viceroy eagerly inquired if he had been down in the pit. The rest we will give in his own words. "Answering in the affirmative, and that I did not consider that there was the remotest chance of discovering coal in such a locality, he inquired the exact depth of the pit, and if in England coal existed at greater depths. On my replying that certainly coal had been found and worked deeper than the shafts at Tourrs, he struck the table such a blow with his fist that the shock sent the cards flying up, exclaiming, while fire darted from his eyes, "Then I'll sink a thousand yards." I made my salaam, and, rising, left the old Turks nearly in the same state as the trees in the petrified forests."

The Pacific Telegraph Opened to Salt Lake City.

The Pacific Telegraph line was opened to Salt Lake City on the 18th ult., and Brigham Young sent the first message over the wires, as follows:—

GREAT SALT LAKE CITY,
Friday, Oct. 18, 1861.

Hon. J. H. Wade, President Pacific Telegraph:

SIR:—Permit me to congratulate you on the completion of the Overland Telegraph line west to this city; to commend the energy displayed by yourself and associates in the rapid and successful prosecution of a work so beneficial, and to express the wish that its use may ever tend to promote the true interests of the dwellers on both the Atlantic and Pacific slopes of our continent.

Utah has not seceded, but is firm for the constitution and laws of our once happy country, and is warmly interested in such successful enterprises as the one so far completed.

BRIGHAM YOUNG.

NEW GREEN COLOR.—A green color not inferior to that made from poisonous arsenic is produced by melting 59 parts of tin with 100 parts of nitrate of soda in a crucible, and then dissolving it when cold in a solution of caustic alkali. The clear portion of this solution is then diluted with water, and a cold solution of sulphate of copper is added. A reddish-yellow precipitate now results, which, on being washed and dried, becomes a beautiful green.

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Jute, Gunny Bags, &c.

This subject has of late attracted considerable attention, and the inquiry, what is gunny bags? has frequently been made to us. This question is fully answered by the following article taken from the London *Mechanics' Magazine*:—

The word "jute" is derived from the Bengalee term *Chuti*, which means false or deceptive, on account of the fiber having the appearance of beautiful silk when it is exposed to the sun for drying. It is the fiber of a plant which is very extensively cultivated throughout Bengal, and of which there are several varieties. One of these species furnishes the gunny so well known in commerce. The word "gunny" is a corruption of *Goni*, the native name on the Coromandel coast for the fibers of the *Corchorus Olitorius*. These fibers are made into the coarse cloth which we call gunny; also, into cordage, and even paper.

Jute is indigenous to the soil of India, and has been cultivated by the natives for centuries. The manufacture of gunny bags or chutties, as they are called, gives employment to tens of thousands of the poorer inhabitants in Bengal. "Men, women and children," says Mr. Henley, "find occupation therein. Boatmen in their spare moments, husbandmen, palankeen carriers and domestic servants—everybody, in fact, being Hindoos (for Musselmen spin cotton only), pass their leisure moments distaff in hand, spinning gunny twist. Its preparation, together with the weaving into lengths, forms the never-failing resource of that most humble, patient and despised of created beings, the Hindoo widow. This manufacture spares her from being a charge on her family; she can always earn her bread. Among these causes will be discerned the very low prices at which gunny manufactures are produced in Bengal, and which has attracted the demand of the whole commercial world. There is perhaps no other article so universally diffused over the globe as the Indian gunny bag. All the finer and long-stapled jute is reserved for the export trade, in which it bears a comparatively high price. The short staple serves for the local manufacturers; and it may be remarked that a given weight of gunny bags may be purchased at about the same price as a similar weight of raw material, leaving no apparent margin for spinning and weaving."

Dr. J. Forbes Watson states that 300,000 tuns of jute are grown in India, of which upwards of 100,000 tuns are exported as gunny bags, beside 40,000 tuns in the raw state. The production admits of unlimited extension.

The demand for gunny bags is so great that a London company has established a large manufactory in Calcutta for their manufacture, and about £300,000 has been already expended. The quality of this bagging is said to be far superior to any of the same kind manufactured in England; but there is no chance at present of these India made bags coming into competition with those made in this country, as the demand is so great for local consumption and for export to other countries. Immense numbers are used in the Bombay and Madras Presidencies, and in Manchester large quantities of imported gunny bags are sold to the paper makers and for repacking.

The gunny bag or cloth is used in Penang, Singapore, Batavia and the whole of the Indian Archipelago, for packing pepper, coffee, sugar, &c.; on the west coast of South America for nitrate of soda, borate of lime, regulus of silver, &c.; in the Brazils for copper and cotton, and in the United States for packing cotton; in fact, it is superseding all other materials for this purpose. With the coffee, pepper, sugar, cotton, &c., these bags are imported into Liverpool, London and other places, then sold to wholesale dealers, who again dispose of them to retailers in the country. Some people make a good trade by buying up the bags that have held sugar and selling them again to the ginger beer or "pop" manufacturers, who first boil them to get out all the saccharine matter to sweeten this popular beverage, and then dispose of the bags to the mat makers. Other bags are purchased direct from grocers by mat makers, who use them to make the bottoms of mats, jute being employed for the surface, and these mats are sold all over the country.

Each gunny bag weighs on an average two pounds. Gunnies, or pieces of gunny cloth, are usually thirty yards long, and weigh about six pounds. From 6,000,000 to 10,000,000 gunnies, beside some thousand ready-made bags, are exported annually from India, chiefly to North America; 4,000 to 5,000 tuns of fiber and rope made of sunn, a similar fiber, are also shipped yearly.

The whole supply of jute to this country comes to us through Calcutta. Cargoes are usually completed with it. It is used in every town in the United Kingdom, and for a great variety of purposes, such as clothes lines, halters for horses, sail lines, shipping ropes, &c. It has long been extensively employed in the manufacture of coarse goods, such as cheap carpetings, bags, sacks, &c. The high price of flax of late years has also led to its extensive use in yarns hitherto purely flax or tow. It is mixed with the cotton warps of cheap broadcloths, and also with silk, and from its luster can scarcely be detected. In Dundee, especially, it is employed in the manufacture of many fine fabrics, and the quantity now imported into that place is estimated at 40,000 tuns annually. The total imports of this fabric have increased rapidly of late years. The average import for the four years, 1853 to 1856, inclusive, was 506,922 cwts.; and for the four years, 1857 to 1860, inclusive, it was 824,016 cwts. yearly. Nearly all imported was used in the Kingdom, the reshipments not exceeding 12,000 or 15,000 cwts. yearly. In some form or other it is now used in nearly every house in Great Britain.

The importation of jute may be said to have commenced about twenty-five years ago. At that time the price of it in Bengal was from 12 to 14 annas (1s. 6d. to 1s. 9d.) per 100 pounds; on July 1, 1861, it was quoted in the Calcutta *Price Current* at 16 rupees (32s.) per 300 pounds. That is, the demand for jute fiber and articles made from it has increased so rapidly that it is between six and seven times dearer in Calcutta than it was only twenty-five years ago, thus furnishing a remarkable proof of the benefit arising from extended intercourse with India.

So far as we know, there is not a manufactory of gunny cloth in the United States. Bed cords, made of jute hemp, are made at some of our cordage factorise, but this is all the length to which we have advanced in the manufacture of this Indian grass. Jute hemp cannot be spun upon cotton machinery, as it requires to be treated with a soapy solution compound of oil and alkali. In order to adapt machinery for spinning new fibrous materials of the flax and hemp species, special attention should be directed to arrangements for what is called "wet spinning"—that is, spinning the materials in a moist condition, the same as the flax is spun on the hand wheel when moistened with saliva.

Canadian Patent Laws.

Our readers are well aware that we have frequently pointed out the illiberal character of the Canadian laws of patents, and have urged upon the Provincial Parliament the importance of amending them so as to allow citizens of the United States to secure their inventions in those Provinces. The recent discussion of the patent system in the English journals has awakened some interest in Canada on the subject, which we hope may result in some good. The *Progressionist*, published at Morpeth, C. W., says in a recent issue:—

The short-sighted policy of certain enactments affecting Canadian interest is apparent in nothing more than the illiberal character of our patent laws. We have copied from various prints, at different times, articles calling attention to the defects in our patent system, hoping thereby to stimulate inquiry and reform. Here are three millions of people, a large proportion of whom are agriculturalists and mechanics, and a vast territory open to the operation of the industrial arts and sciences, and as yet we possess the most primitive means for promoting their general advancement. We have no properly organized Patent Department—and more, there are no inducements held out to foreign inventive genius. According to section 11 of the amended patent law of 1851, no patent "shall be granted for the invention or discovery of any new and useful art or machine, made, discovered or used in the United States of America, or in any part of her Majesty's dominions in Europe or America." There cannot be the least doubt, as an American cotemporary observes, that this provision in the patent laws "has really had the effect of preventing the introduction of many improvements." To quote further from an article we find in the *Scottish American Journal*:—

"A few weeks since a friend of ours was solicited to make inquiry in regard to obtaining a Canadian patent for an invention lately introduced in the city of New York, and which has been very profitable, beneficial and successful. The parties who made the application intended to introduce the invention into Montreal and several other cities in Canada, and it would have cost them from $3,000 to $10,000 for the machinery, according to its size in each case. All this would have been so much wealth conveyed into Canada; but the result of the inquiry was that no patent could be obtained for the invention, because it happened to have been made in the United States. The proprietors of the invention sensibly said: 'We will not spend so much money in introducing the improvement into Canada, for it would be a mere venture, as some persons in that Province, after we had been at all the trouble of inventing, perfecting and introducing the improvement, might easily find ways and means to copy our mechanism, and without incurring a tithe of our trouble and expense, set up opposition.' This is one case with which we are perfectly well acquainted, and we have heard of many others of a similar character."

Railroads in India.

The London *Review* has an account of the progress recently made in the construction of railroads in India. Inasmuch as the capacity of that country for the production of a profitable cotton crop is greatly dependent upon her railroad facilities, the following statistics are important, showing that the means of access to the seaboard are rapidly increasing:—

Since January 1, 1861, 211 miles of additional railroad have been opened in India. In 1860, 206 miles of new road were added to the 634 miles open on January 1st of that year. According to the latest information, we have then a total of 1,063 miles of railway in use for the purposes of traffic. The amount is small compared to the extent of railways in England or the larger extent in the United States, but it exceeds the entire extent of lines existing in the vast empire of Russia. It is expected that 1,353½ miles, including the 211 miles already opened since January, will be completed in the present year, out of 2,932½ miles now in course of execution. In 1862, the remainder will probably be finished. To feed them the government is directing the construction and improvement of common roads, of which forty-three, of an aggregate length of 1,083 miles, are already designed in Madras, to communicate with the rail that crosses the peninsula.

The lines seem wisely planned. The longest, the East Indian, runs northwesterly through the whole breadth of our dominions from Calcutta, connecting it with Lahore, and uniting both with the Indus. The Great Indian runs northeasterly from Bombay into the center of India, and connects that shipping port with the other line at Jubbelpore, to which a branch from the East Indian runs southwesterly. Running from Bombay northwesterly to Ahmedabad is the Bombay and Baroda, which brings a large cotton district into close connection with English shipping. From Bombay, too, the Indian Peninsula runs southeasterly, and joining the Madras at Moodgul, which runs thither from Madras, is intended to connect these two provincial capitals. Again, from Madras a line runs westsoutherly across the peninsula, and terminates at Beypore, on the Malabar coast. From this last line, also, the Great Southern of India starts, and runs to the coast opposite to Ceylon. Finally, the Scinde connects the port of Kurrachee with Hyderabad and the Indus. In time India will be better supplied with railroads than ever it has been with common roads.

Notes on Foreign Inventions.

Artificial Stone and Cement.—F. Ransome, England, patentee. Broken pieces of chalk are mixed with the silicate of soda until the compound is of the proper consistency, when it is molded into any desired form, and allowed to dry gradually. When the articles molded have become dry and hard their surfaces are washed with a solution of chloride of calcium, or chloride of aluminum. By this treatment the surface of the molded stones is converted from a soluble into an insoluble silicate of lime. In this manner, blocks of artifical stone, which are very durable, are produced. By mixing powdered chalk with the silicate of soda, a cement is obtained suitable for plastering over the surface of walls. After it is laid on, and has become hard, its surface, like that of the stone, is also washed with the chloride of calcium or the chloride of aluminum, or other salt made from an alkaline earth, so as to render the surface insoluble.

Percussion Cap Substitute.—C. Hanson, London, patentee. In igniting gun cotton, or gun powder, and such explosive compounds in fire arms and cannon, this inventor applies compressed air, forced through a small tubular aperture running into the breech, in which the charge is contained. Highly compressed air is capable of igniting match paper and gunpowder. We have frequently used it for the former. It is intended by this device and application of compressed air, to dispense with percussion caps and common igniting compositions. If uniformly reliable, this compressed air igniter may be a good improvement.

A Great Gun.—Lieut. Col. Clay constructor. At the Mersey street works, Liverpool, England, a wrought-iron cannon is now being manufactured that is 12 feet in length, 35 inches in diameter, at the breech, and 18 inches at the muzzle. The bore is 10¼ inches in diameter; it is rifled, and the grooves make one revolution in 30 feet. The entire weight of this gun when finished will be 10 tuns. It is a muzzle loader, and intended to carry an elongated shot of from 500 to 700 lbs. It is made throughout of wrought iron, forged hollow, and has been named the "Prince Alfred."

Lubricating Pistons.—J. Ellis, J. Stringer and J. Braddock have obtained a joint patent for constructing the stuffing box of a piston rod with a receptacle for containing oil or grease. The lubricating material passes to the piston rod through apertures in the inner part of the stuffing box, and the rod is made with a groove in it, for a certain quantity of oil or grease to enter at each stroke when the engine is working. A similar apparatus is applicable for lubricating the valve rods and valves of engines, when the rods work with a reciprocating rectilinear motion.

New Paint.—George Hallett and John Stenhouse, England, patentees. The native oxyd of antimony, the color of which varies from a light yellow to a yellowish red, consists of antimony, in combination with oxygen, some sulphide, oxyd of iron, silica and frequently arsenic. This mineral is first freed by the patentees from gangue, then reduced to fine powder by grinding and sifting. The powdered oxyd is now placed in large crucibles, and roasted cautiously in a suitable furnace, at a low, red heat, the air being allowed free access. During roasting the ore is stirred occasionally, and it gives off sulphurous acid and arsenical fumes. The process of roasting occupies about three hours, and is known to be complete when no more of the vapors are given off. All the antimony in the ore is now found to be in the state of anhydrous, antimoneous acid. This is reduced to an impalpable powder by grinding and levigating with water. When dried it constitutes a new pigment, and when ground with oil and varnish forms a yellow paint. About eight parts of crude antimony, three of red lead, and one of the oxyd of zinc roasted slowly at a red heat for three hours on the hearth of a reverberatory furnace, makes a good yellow paint also when reduced to powder and mixed with oil.

The adventurous La Mountain came very near being shot recently while on a balloon survey near the Potomac. A German regiment, mistaking him for a secession buzzard, blazed away at the aeranaut for several minutes,

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RECENT AMERICAN INVENTIONS.

Tool for Cutting Grooves.—J. L. Taylor, of New York city, is the patentee of this invention, which is designed to attain a tool or implement for superseding the ordinary manipulation of plowing or cutting rectangular grooves in boards, planks, &c., which are necessary in erecting shelving and for various other purposes in joinery. The invention consists in the employment or use of two circular plates placed on a suitable mandrel, having serrated or fleam-toothed cutters attached, and chisel-shaped cutters fitted between the two plates, whereby the desired end is attained.

Album Case.—The object of this invention, patented by William Miller, of New York city, is to produce an album ease which can be opened out so as to exhibit a number of photographic cards at once, and be conveniently folded or shut up in a compact form to resemble a book, and it consists in the manner of forming the leaves of metallic plates so that each shall be capable of holding and exhibiting two pictures; also in the manner of connecting the leaves together, half of which shall constitute the case to the front edge of one cover, and the other half to the other cover, which covers are hinged together at their backs and fastened in front by a single clasp of the kind usually used for books and daguerreotype cases.

Water Meter.—Benjamin S. Church, of New York city, is the patentee of an invention for a water meter which consists in arranging within a cylindrical case two plungers fitted to work one within and independently of the other, in such a manner as to leave a passage for the water to flow in and out of the meters in all positions of the plungers, and to prevent any water from passing through the meter without being measured.

Ward's Navy Signals.

Mr. W. H. Ward, the inventor and patentee of the system of Ocean Marine Telegraph, now in use on board the ships of the Channel Fleet, exhibited, with the authority of the Admiralty, at Portsmouth, on Wednesday evening, the mode of working the night signals portion of his system. The four lanterns, or rather signal lamps, which are used for the purpose were hung from the crossjackyard of the *Shannon* frigate, lying off the dockyard at her harbor moorings, and were read and answered from the platform of the King's Stairs, where Rear-Admiral, the Hon. George Grey, superintendent of the dockyard, and other officers were assembled. Mr. Ward, having seen his lamps fixed in a perpendicular position on board the *Shannon*, explained the manner of their working to some seamen signalmen that had been sent on board for the purpose from her Majesty's ships *Warrior* and *Asia*. So simple is the working of the signals that, on Mr. Ward being sent for on shore to explain his method to Rear-Admiral Grey, the men on board the *Shannon*, who had never before seen the lamps or their mode of working, signaled with them "Reef topsails," spelling each word through from the alphabetical code, as thus—showing one red and three white lights for "R," the change in the disposition of the light each time representing a letter. The operator stands with four small lines in each hand, by pulling which he exhibits "White," "Red," or "Black," as required to give the letter. Numerals are given with three lamps. The whole of the lamps "flashed" by raising or lowering the screens quickly three times denote the end of a number, word or sentence.—London *Globe*, Oct. 3d.

[Mr. Ward is an ingenious American who left this country for Europe several years since with a machine for swedging solid bullets of every form from thick lead wire. He called upon us and explained the construction and operation of his machine before his departure, and we understand that he has since furnished several to different European governments. His signalling system appears to be very simple, and it has been highly appreciated by the British Admiralty. If superior to the system which is in use in our own fleet, it is time that Mr. Ward's services were rendered available for his native country in this her hour of need.—Eds.

BIBLEOTHECA SACRA. Published by Warren F. Draper, Andover, Mass.

The October number of this able theological quarterly contains a sketch of Hindoo philosophy, by Dr. Scudder, and an article on Jonathan Edwards, by Rev. J. P. Thompson, D. D., New York. The latter article revives the controversy about Adam's sin between Congregational and Presbyterian theologians.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING OCTOBER 15, 1861.

Reported Officially for the Scientific American.

PATENTEES, READ THIS.

The new Patent Laws which went into force on the 2d of March last, authorized the Commissioner of Patents to have all the specifications which form part of the Letters Patent printed.

This is a wise provision, and it renders the documents much handsomer than the old system of engrossing them on parchment; besides, in passing before the printer and proof reader, the clerical errors, which were often made by the copyist, are mostly obviated, thus rendering the patent more likely to be correct.

But to afford the printer and proof reader an opportunity to do their work properly, the Patent Office is obliged to withhold the Letters Patent after granting them, from *four to six weeks* after the claims are published in the SCIENTIFIC AMERICAN.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 4, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

2,466.—David Ahl, of Newville, Pa., for Improvement in Surgical Splints:

I claim making a surgical splint of a material which is plastic and flexible when hot, and flexible when cold or dry, that its shape may be formed or modified, at the will of the surgeon, to fit the member or part to which it is to be applied, and which will be sufficiently firm without being rigid and painful to the wound or fracture.

2,467.—T. K. Anderson, of Addison, N. Y., for Improvement in Oil Cans:

I claim the air tube, C, when applied to the can or filler, substantially as shown and described, to admit of the escape of the contents of the can by a proper manipulation of the latter and at the same time prevent a waste or casual discharge by the upsetting of the can or from other causes, as set forth.

[This invention relates to an oil can or filler for replenishing lamps with oil, and also for supplying the journal boxes of shafting and other working parts of machinery with lubricating material. The object of the invention is to obtain a can or filler which will not admit of its contents casually escaping from it, and by which the lubricating of the working parts of machinery, as well as the filling of lamps or other oil receptacles is greatly facilitated and waste of oil prevented.]

2,468.—T. G. Bancroft, of Worcester, Mass., for Improvement in Umbrellas and Parasols:

I claim the flanged collar, b, extension tip, B, screw rod, a, cover, H, and socket tips, F F, or their equivalent, in combination with the frame of an umbrella or parasol, when arranged and operating in the manner and for the purposes substantially as described.

[This invention consists in a construction of an umbrella or parasol frame which admits of the use of white or some light-colored cloth for covering, and which, when soiled, can be easily removed from the frame, to be washed and replaced again, or a new one substituted at the will of the user.]

2,469.—Olney Bolster, of Worcester, Mass., for Improved Stall for Animals:

I claim the combination and arrangement of the beveled floor timbers and the stop, D, when constructed in the manner and for the purposes substantially as set forth and described.

2,470.—John Carton, of Utica, N. Y., for Improvement in Parlor Heaters:

I claim the cap, L, with the neck, G′, and the rings, E′ and F′, and the openings, H H, and the passages, J J, constructed and operating substantially as described.

2,471.—B. S. Church, of New York City, for Improvement in Water Meters:

I claim, first, The combination of the two plungers, E D, fitted to work one within and independent of the other, the outer plunger acting as a cylinder into which the water passes to actuate the first and to be measured, with the compartments, B B′ B″ passages, I I, and f f, arranged and operating substantially in the manner described.

Second, The latches, m m, in combination with the plunger, D, flanges, a a, and tappets, k k, when arranged and operating in the manner and for the purposes described.

2,472.—Charles Claude, of Newark, N. J., for Improved Lock:

I claim, first, The combination of stop plate, G, with lock bolt, H, and spring, I.

Second, The thimble, F, in combination with the lock bolt, J, and spring, I.

Third, Key, N, in combination with the lock, as described.

2,473.—William Craig, of Binghamton, N. Y., for Improved Cut-off for Oscillating Engines:

I claim the cut-off, K, applied to oscillate on the stem of and in contact with the base of an independently oscillating slide valve within one of the trunnions of an oscillating steam engine, in combination with the adjustable arc piece or double stop, m, also applied within the trunnion, but movable or adjustable, under the control of a governor or other device, on the exterior thereof, the whole operating substantially as set forth.

2,474.—G. G. Crose, of Schoolcraft, Mich., for Improved Device for Marking Corn Furrows:

I claim the arrangement with the runners, a a, and ties, b, of the hinged planks, C C D′ D′, and runners, E E g g, as shown and described, so that two, three, four, five, or six furrows may be made as desired, all as set forth.

[The object of this invention is to obtain a machine which will conform to the inequalities of the surface of the ground, and thereby prepare its work in a more thorough manner than usual, and which will also admit of being adjusted to mark two, four, six or more rows simultaneously, and be capable of being folded so as to clear obstructions when necessary, and also to pass through gates or bars with facility.]

2,475.—M. De La Montanya, of San Francisco, Cal., for Improved Blacksmith's Portable Forge:

I claim, first, The application of the double-acting blowing cylinder to portable forges.

Second, The closed chamber, O, occupying the main body of the forge and employed to equalize the blast between the cylinder, D, and tuyere, P, as explained.

2,476.—John Gault, of Boston, Mass., for Improvement in Setting Vault Lights:

I claim, first, Placing an adjustable glass below a vault cover, and detached therefrom, for the transmission of light.

Second, The combination of a perforated metallic vault cover, with a glass beneath it, so arranged that the latter may be attached or removed in whole or in part, at will.

2,477.—J. P. Gillespie, of New Albany, Indiana, for an Improvement in Metallic Cartridges:

I claim the cartridge case provided with points or pins, x x, near its mouth, for forming a thread upon the ball, and retaining it in its position, substantially as set forth.

2,478.—P. Giraud, of New York City, for Improvement in Mode of Preserving Butter:

I claim preserving butter by means of the sacks and brine in casks, as set forth.

2,479.—Michael Greenebaum, of Chicago, Ill., for Improvement in Heating Apparatus:

First, I claim the arrangement relatively to the stack, b, and fire grate, s, (of a heater, n,) of the cylinder, d d m, cylinder, a, flues, c c, and circulation pipes, f f, the whole operating conjunctively, substantially in the manner and for the purpose described.

Second, The combination of the devices, l g h and j with a heater, n, constructed substantially as described, and combining the cylinders, d and a, flues, c c, and circulation pipes, f f, as described, for the purpose set forth.

Third, The combination and arrangement of the grate, s, stack, b, transverse pipe, e, and cylinders, d a, flues, c c, circulation pipes, f f, and devices, l g h and j, in the manner and for the purposes described.

2,480.—D. M. Gunn and C. L. Cain, of Oskaloosa, Iowa, for Improvement in Bee Hives:

We claim, first, The combination and arrangement of the slides, D E G I, with the guard-wires, o q, and the removable covers, H M, substantially as shown, for the purpose of confining the bees in either part, C J, of the hive, and rendering the contents of either part accessible, as set forth.

Second, The combination of the partially perforated slides, D E, with the dark ventilators, K and i, in the hive, constructed and arranged, substantially as and for the purpose specified.

[The object of this invention is to obtain a bee hive which will afford a better protection than usual against the moth, and also admit of a perfect ventilation, as well as a more convenient arrangement than hitherto for the confinement of the bees, or their separation from the spare honey boxes, with a view of removing the honey therefrom.]

2,481.—J. A. F. Lair, of Paris, France, for Process for Reducing Copies of Engravings, &c.:

I claim producing reduced copies of engravings or other objects, by first making molds of the object in gelatine or other equivalent substance, then contracting the said molds by immersion in chemical baths, or otherwise, and finally electrotyping the contracted molds, substantially as set forth.

2,482.—W. M. Lee, of Rosindale, Wis., for Improvement in Bee Hives:

I claim, first, Dividing the hive rack vertically through the center, without a partition, in such manner as equally, or nearly equally, to divide the brood comb, the bees and honey, substantially as set forth.

Second, I claim the peculiar construction and arrangement of moth trap, with slides for closing the hive at night, and ventilating screen, substantially as set forth.

Third, I claim the honey boxes, provided with screens operated by springs on the bottom, substantially as set forth.

Fourth, I claim the arrangement of the removable strip, dovetailed into the front, for the purpose of holding the two parts of the hive, and for the bees to alight upon, as set forth.

2,483.—Leonard Marsh, of Burlington, Vt., for Improvement in Screws:

I claim the method before described of increasing the adhesion between a screw and its matrix, by splitting the screw and forming be split portion into an elastic arch, substantially in the manner and for the purposes set forth.

2,484.—W. N. Martin, of Providence, R. I., for a Sash Holder and Fastner:

I claim the arrangement of the levers, e f e f, the pivot, i, the spring, g, and the casing, d h, with each other, and with the rack bar, k, in the manner set forth.

2,485.—J. R. Morrison, of East Springfield, Ohio, for Improvement in Apparatus for Cleaning and Renovating Feathers:

I claim, first, The employment of the wings, D, D, upon the shaft, B, when constructed and used, for the purpose specified.

Second, The arrangement of the shaft, B, the wings, D, and the perforated pipe, E, as and for the purpose specified.

Third, The combination of the shaft, the wings, and the perforated pipe with the divided case, constructed as and for the purpose set forth.

2,486.—J. R. Morrison, of East Springfield, Ohio, for Improved Washing Machine:

I claim the spring bow, E, constructed as described, and provided with the set screw, a, when used in connection with the lever F, and the dividing board, c, the whole being arranged to operate as and for the purpose specified.

2,487.—Alexander Ralph, of Centreville, Del., for Improved Foot Scraper:

I claim the combination of the scraper with the forked spring bar and brushes, or gutta percha or gun cleaners, substantially as specified.

2,488.—Ruel Rawson, of Warsaw, Ind., for an Improvement in Saw Sets:

I claim the described wrench and saw set, when combined, as a new article of manufacture, substantially as set forth.

2,489.—James Reidy, of Cork, Ireland, for an Improvement in Machines for Breaking Stones and other Hard Substances:

I claim the combination of a hammer or hammers and the cutters, arranged and operating as described, with reference to the drawing annexed, for the breaking of stones and other hard substances, as described.

2,490.—James Robertson, of New York City, for an Improved Water Closet Utensil:

I claim the combination of the pump, F, water reservoir, C, foul chamber, L, provided with the basin, N, and water seal, M, the basin, N, being provided with a balance pan, O, and the pump, F, provided with an eduction pipe, H, the end, I, of which is arranged relatively with the basin, N, and connected to the lid, K, as shown, and all arranged to form a new and portable article for the purpose specified.

[The object of this invention is to obtain a simple and efficient portable water closet, designed to supersede the ordinary chambers in use and to answer a purpose similar to those water closets which are permanently supplied with water under pressure. The invention is applicable for ships and all vessels of navigation, as well as for general domestic use.]

2,491.—J. P. Schenkl, of Boston, Mass., for an Improvement in Safety Concussion Fuses for Explosive Projectiles:

I claim securing the nipple carrier to one side of the inner wall of

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the case by means of a screw, and so countersinking the hole made through the case for the reception of such screw as to form a sharp cutting edge whereby the said screw shall be cut off smooth with the inner surface of the case and the outer surface of the nipple carrier, in manner and under circumstances as set forth.

2,492.—J. F. Seiberling, of Doylestown, Ohio, for an Improvement in Harvesters:

I claim, first, The arrangement and combination of the treadle, F, rod, U, and elbow lever, V, rod, G, and lever, H, for elevating and depressing the dropper, M, and cut-off, L, through lever, I, and rod, K, substantially as set forth, for the purposes described.

Second, I claim the arrangement of the hinged bars, Q and R, for supporting the heel of the cutter beam and for elevating and depressing the same and the reel by means of lever, T, or other device, said hinged bars being used in connection with the shoe or bar, O, and its flexible attachments, substantially as set forth.

Third, I claim the combination of the slatted dropper, M, the cut-off, L, and the finger beam, substantially as described.

2,493.—Philander Shaw, of Boston, Mass., for an Improvement in Utilizing the Exhaust of Caloric Engines:

I claim, first, So arranging and applying steam boilers, in connection with the exhaust passages of hot air engines, that a portion of the caloric contained in the exhaust of such engines shall be utilized in the generation of steam, substantially as specified.

Second, The arrangement, operating substantially as set forth, of the exhaust passages of a hot air engine with a suitable boiler and its furnace, to generate steam either by the exhaust from such engines or by the combustion of fuel in the boiler furnace.

2,494.—Charles Shivers and Stephen Ustick, of Philadelphia, Pa., for an Improvement in Linings for Chimneys:

We claim forming the end tiles, A, and side tiles, B, with rebates, substantially as described, and making the said end tiles of different perpendicular dimension to that of the side tiles, so as to break joints in the construction of the flues when they are arranged in relation to each other substantially in the manner and for the purposes set forth.

2,495.—A. J. Smith, of Decorah, Iowa, for an Improvement in Beehives:

I claim a beehive having its walls formed by straw, hay or other similar fibrous non-conducting substance, and wirecloth arranged within a suitable frame, substantially as and for the purpose set forth.

I further claim the adjustable flap or door, E, in combination with the eccentric button, H, placed within the recess or opening, q, of the alighting board, G, and all arranged as and for the purpose specified.

[The object of this invention is to obtain a beehive which may be very economically constructed, much better ventilated than usual, and also capable of affording greater protection against the bee moth. The invention also has for its object a convenient means for regulating the dimensions of the opening or passage way into the hive, whereby the moth may not only be excluded, but also drones when desired, and the queen bee retained in the hive.]

2,946.—John and Jacob Stock, of New York City, for an Improvement in Boxes for Dry Photographic Plates:

We claim, first, The arrangement of a box with movable covers in combination with suitable crosspieces, n and m, acted upon by springs to exclude the light from the inner side of said box, constructed in the manner and for the purpose set forth.

Second, We claim the arrangement of the projection, w, at the end of the upper cover, in combination with the projection, v, and spring, s, on the lower cover, in the manner and for the purpose specified.

Third, We claim the slide, g, covering the hole, h, for the passage of the plate of glass, operated and arranged in the manner and for the purpose set forth.

Fourth, We claim the hinged lever or arm, D, provided with notches and operated by the spring, 3, in the manner and for the purpose described.

Fifth, We claim the projection, x, on the side of the plate holder acting upon and operating the slide covering the hole in the top cover, in the manner and for the purpose substantially as described and set forth.

2,497.—J. L. Taylor, of New York City, for an Improvement in Grooving Machines:

I claim the described tool for "dadoing" or grooving, which consists of the grooved clamping plates, A A, adjustable cutters, C C D, guides, i, and screw shaft, B, arranged, constructed and operating together in the manner shown and described.

2,498.—William H. Towers (assignor to W. S. Bard), of New York City, for an Improvement in Broom Handles:

I claim forming a series of grooves around broom handles, of such relative sizes and distances apart, as shall correspond with the bulk of the successive layers of broom corn, and the positions of the respective lines of windings of the wire binding the ends of the same in the grooves, substantially as described.

2,499.—William Watson, of Tonica, Ill., for an Improvement in Railroad Rails:

I claim the improved mode of construction of the railroad rail in its several parts as described, in combination with its supports and braces bolted and fitted together, in the manner and for the purposes described.

2,500.—Edward M. Wright, of Marysville, Cal., for an Improvement in Nozzles for Hose Pipes:

I claim the use and application of the water chamber, C, formed by the projections, f f, for the use and purpose and in the manner substantially as set forth.

2,501.—D. B. Chatfield and J. M. Dutcher, of La Grange, Wis., assignors to Thomas Harrison, of Lafayette, Wis., for an Improvement in Water Elevators:

We claim the above described water elevator, in combination with the fans, N, substantially in the manner and for the purposes set forth.

2,502.—B. P. Foster and Wm. H. Chaffee (assignors to Wm. H. Chaffee), of Flint, Mich., for an Improvement in Ditching and Tile-laying Machines:

We claim, first, The arrangement of teeth on the buckets of an endless chain, so that those on one bucket will follow the interstices between the teeth of the one which precedes it, in such a manner as to give alternately different depths of penetration, and these two be followed by a third bucket having a scraper instead of teeth which cleans up the loose dirt which the others have left, as described.

Second, The combination of the guide, 14 and 15, reel, 13, and spout, 29, by which the tiles are laid and covered arranged to work in connection with an excavating apparatus, substantially as described.

2,503.—Wm. Miller (assignor to himself and Samuel P. Williams, Jr.), of New York City, for an Improvement in Cases for Photographic Cards:

I claim, first, Forming the leaves of the case of metallic plates by turning up a lip on three sides of the same, lapping and soldering them together in the manner described, so as to leave a space between them for the introduction and exhibition of two pictures in the manner described.

Second, The manner of connecting the leaves together by hinges, a, formed of two short sections of tubing, substantially as described.

Third, Attaching the backs of the covers by long hinges, b b, and the leaves to the front in such a manner that when the case is shut the leaves are folded therein and the whole fastened together by a single clasp, f, as described.

2,504.—Robert Ross (assignor to himself and Richard Bond), of Pittsburgh, Pa., for an Improvement in Oil Cup or Lubricator:

I claim the screw valve, D, with its stuffing box, and the screwed valve spindle, E, in combination with the annular chamber, i, and its passages, j, the whole being constructed and arranged in respect to the upper reservoir, A, and lower reservoir, B, as and for the purpose set forth.

1,962.—John Dement, of Dixon, Ill., for an Improvement in Plows. Patented July 30, 1861:

I claim the arrangement of the shield, A, the bar, B, wedge, c, and hinge, K, with the attachment, E, and shank to which the plow blade is attached, in the manner and for the purpose specified.

Notes and Queries

C. H., of Mass.—Purple stars for rockets are composed of chlorate of potash, 42 parts; saltpeter, 22 parts; sulphur, 22; black oxyd of copper, 10; strontian, 30. Green stars are composed of nitrate of barytes, 62 parts; sulphur, 10; potash, 23; orpiment, 2; charcoal, 2. Yellow are made with nitrate of soda, 74 parts; sulphur, 20; charcoal, 6. The stars for rockets are prepared by forming the composition into a stiff, doughy paste, and cutting it into square pieces, after which they are dusted with meal powder to insure their ignition.

H. C., of Md.—Machines for pressing Minié and spherical bullets are used by Le Roy & Co., of this city, but we are not acquainted with their construction as they are kept secret.

M. B. T., N. J.—On page 50, Vol. II. (new series) Scientific American, you will find a table of velocities for belting with the horse power, and width of belt according to the velocities required.

P. M., of N. J.—The invention you have had in use so long is public property. The inventor who has secured a patent for it cannot hold it against such testimony as you are able to bring forward, providing you are correct in your knowledge of what he has patented. You are safe to use what you have now in operation.

J. M. W., of N. Y.—We advise you by all means to have a preliminary examination made at the Patent Office, in order to ascertain such facts as you want in reference to improvements for pitching hay into wagons. We have sent you by mail one of our pamphlets of advice.

C. A. S., of Ill.—Your invention is not patentable. History tells of a series of sun reflectors having been used by the Syracusans with good effect in setting fire to the Roman fleet by which their city was besieged 415 years before Christ. See page 235 this volume, article on Magic Mirrors and Burning Lenses.

S. McQ.—The best material for your ducking gun is wrought iron, welded in the usual way. For an inch and a quarter bore the walls ought to be at least a quarter of an inch thick at the breech and three-sixteenths at the muzzle.

H. D. P., of Vt.—We thank you for the fine list of subscribers you send us. If all our friends throughout the loyal states would do as well as you have done we should soon make up for the several thousand subscribers we have lost in the Southern States.

R. D., of C. E.—We have mailed you a copy of our new patent law, and we sincerely hope that you will succeed in procuring a more liberal law in the Canadas. Your present system is a libel upon justice and good sense. We have published all the information we possess upon the subject of clarifying coal oil.

A. S., of Pa.—We know of no better work on rural architecture than Downing's. You can get it by writing to any of the principal booksellers of the city—C. S. Francis & Co., or D. Appleton & Co.

J. C. H., of N. Y.—Your suggestions about indexing are very good and have been presented to us before. We would gladly adopt them but for some practical difficulties which we may think less of at some future time. We are glad to know that you value our paper so highly.

D. McJ., of C. W.—The mineral which you have sent us is not gold, but iron pyrites, and has no present value here or in Canada. Crucibles used for smelting steel are made of graphite, or refractory Stourbridge clay. They can be purchased in this city; you are not able to make them without some practical instruction. The oxyd of manganese costs only a few cents per pound. The steel made of scrap iron, charcoal powder and manganese is of a very good quality. We do not know the nature of the powders used for castrated horses, and we do not recommend any advertised medicines in particular. "Let every man chose his own physic," and study to partake of it with more grace than we possess for such a trial of faith and practice.

G. P., of N. Y.—We don't discover any patentable novelty in your valve box. The valve is substantially the same as that known as the hollow slide valve; and the arrangement of the valve in the box, and of the passages, is the same as was used with that valve, which was in common use on English steam engines some twenty years ago.

J. D. N., of N. S.—Some specimens of quartz, perfectly colorless, yield considerable gold by crushing and amalgamation. Quicksilver is the only reliable agent known to us for extracting gold from crushed quartz. It requires considerable practical skill to manage the amalgamating process. We could not advise any person here to go to Halifax and experiment with the process you have described.

F. A. F., of Md.—We cannot furnish the receipt for making Arnold's ink, which is manufacfured in London. Its composition has been described to us as consisting of gallic acid and sulphate of indigo, but we have not been able to make the same quality of ink from this receipt; we therefore cannot recommend it to you.

G. C., of N. Y.—The speed of a 1-inch belt conveying 1-horse power is 1,000 feet per minute. The speed of a 10-inch belt conveying 10-horse power is the same. The power conveyed by any belt is always in proportion to the velocity and the width of belt. A 1-inch belt running with a speed of only 100 feet per minute conveys but .092 horse power.

R. B. W., of N. Y.—We know nothing about the sewing machine agency to which you refer. The parties are strangers to us.

C. B. B., of Pa.—Lead pencils are made of plumbago and clay. If you want pastils you can get them of Berolzheimer, Illfelder & Co., 97 William street, this city. If it is what is called metallic styles that you need they can be had of Eberhard Faber, 133 William street.

M. W., of N. Y.—The beard of the milkweed seed has too little strength for cloth. It may be that it would improve in strength by cultivation, but we should have little hope of this result.

C. S. F., of Mich.—There is no alloy of iron and lead. Sheet iron is a cheap and suitable material for salt pans. Iron nails covered with zinc—galvanized as they are improperly called—will resist the action of brine.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Oct. 23, 1861:—

A. H. D., of Cal., $20; O. W. K., of Wis., $20; J. H., Jr., of Vt., $38; W. H. Van G., of N. Y., $40; T. H. B., of N. Y., $20; M. M., of Mo., $20; W. M., of Mass., $20; J. W. B., of N. Y., $25; E. & W., of N. Y., $25; E. M. S., of N. Y., $15; E. & P., of N. J., $15; H. M., of Mass., $15; A. H. W., of Vt., $25; H. H. D., of Conn., $15; B. A. M., of Conn., $33; S. I. B., of N. J., $15; E. F., of Cal., $30; G. M. C., of Cal., $50; W. W., of Wis., $15; H. P., of N. Y., $25; H. & P., of Iowa, $20; M. S., of N. Y., $15; C. W. S., of Maine, $20; C. A. R., of N. Y., $20; B. G. H., of Pa., $20; G. M., of Conn., $20; W. L. F., of N J., $15; G. W. P., of N. Y., $25; J. A. W., of N. Y., $15; J. C., of Conn., $25; P. & O., of Mo., $15; G. I. W., of Mass., $15; F. W. W., of N. Y., $15; J. W. G., of Mass., $25; J. B. R., of Mich., $190; G. A. D., of Cal., $15; O. M., of N. Y., $15; H. McG., of N. Y., $10; C. H. B., of Mass., $20; T. R. R., of Ohio, $45; H. W. B., of N. Y., $20; C. E. H., of N. Y., $20; A. K., of N. Y., $45; R. P. P., of N. Y., $20; J. C. C., of Conn., $20; S. S. P., of N. Y., $15, H. J. S., of Minn., $15; H. W. B., of N. Y., $15; W. W. W., of Ill., $15; J. H. H. B., of N. Y., $15; P. S. F., of N. Y., $25; G. W. M., of Maine, $15; W. H. J., of N. Y., $15; L. C. P., of Conn., $25; N. S. & J. L. H., of R. I., $7; J. W. B., of N. Y., $15; O. B., of Ohio, $20; W. B., Jr., of N. Y., $60.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Oct. 16, to Wednesday, Oct. 23, 1861:—

H. McG., of N. Y.; A. H. W., of Vt.; H. P., of N. Y.; J. L. & N. S. H., of Mass.; J. H. H. B., of N. Y.; L. C. P., of Conn.; J. H., Jr., of Vt.; P. & O., of Mo.; J. C., of Conn.; E. & W., of N. Y.; J. B. R., of Mich.; P. S. F., of N. Y.; J. W. G., of Mass.; H. M., of Mass.; J. W. B., of N. Y.; G. W. P., of N. Y.; B. A. M., of Conn.; S. S., of N. Y.; W. H. Van G., of N. Y.; W. W., of N. Y.

TO OUR READERS.

Models are required to accompany applications for Patent under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

Invariable Rule.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Back Numbers and Volumes of the Scientific American.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume. by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

Binding.—We are prepared to bind volumes, in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express or delivered at the office, 40 cents.

Patent Claims.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

New Pamphlets in German.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York

RATES OF ADVERTISING.

Thirty Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

CHANGE IN THE PATENT LAWS.

PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 4th of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of

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the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

Testimonials.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents :—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial :—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.:—Gentleman : It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submitit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the acts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as a measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Interferences.

We offer our services to examine witnesses in cases of interference, to prepare arguments, and appear before the Commissioner of Patents, or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "*Hints to Inventors*," Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

The Validity of Patents.

Persons who are about purchasing Patent property, or Patentees who are about erecting extensive works for manufacturing under their Patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing Patent, before making large investments. Written opinions on the validity of Patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited For further particulars, address MUNN & CO., No. 37 Park-row, New York.

Extension of Patents.

Valuable Patents are annually expiring which might be extended and bring fortunes to the households of many a poor Inventor or his family. We have had much experience in procuring the extension of Patents; and, as an evidence of our success in this department, we would state hat, in all our immense practice, we have lost but *two* cases, and these were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to insure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with Patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased Patentee may apply for an extension. Parties should arrange for an application for an extension at least six months before the expiration of the Patent.

For further information as to terms and mode of procedure in obtaining an extension, address MUNN & CO., No. 37 Park-row, New York.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

WANTED—A GOOD SECOND-HAND CARDING MAchine, for custom work.—Address J. J. BAKER, Morristown, Rice Co., Minn. 1*

WARREN'S TURBINE WATERWHEEL (WARREN & Damon's patent), manufactured by the American Waterwheel Works, Boston, Mass.—We would say to our patrons and parties in need of Turbine Waterwheels for factories, flouring mills, grist and sawmills, &c., that we are now able to furnish the most powerful, economical, cheap and durable wheel in use. They are constructed upon the most scientific principles, with steel buckets, and are highly finished. Seven hundred are now operating successfully in places where the greatest economy in water is required. Send for pamphlet, with illustrations complete. Address ALONZO WARREN, Agent, 31 Exchange street, Boston, Mass. 18 6

MILITARY FILTERS.—CANTEENS AND POCKET Filters, at 20 cents by the hundred. Syphon Filters at 50 cents, of porous stone, clean and durable. Manufactured by FRED. C. KRAUSE, 772, 8th avenue, corner of 54th street, N. Y., manufacturer of patent porous gas burners, for chemical and manufacturing purposes, &c. 18 2*

TRUSSES.—DR. RIGGS'S HARD RUBBER TRUSS challenges comparison. If not satisfactory, after a fair trial of sixty days, it may be returned. Also, Varicocele Truss, and appliances for enlarged veins. No. 2 Barclay street, New York. 1*

THE TINMAN'S MANUAL AND BUILDERS' AND Mechanic's Handbook.—Second edition ; 208 pages. This practically useful work will be sent by mail (free) to any place in the United States on the receipt, by mail, of $1. I. R. BUTTS & CO., Publishers, Boston, Mass. 18 4*

SOMETHING NEW—AGENTS WANTED—ARTICLES needed in every family.—Patent Transparent cone, for kerosine lamp; Patent Match Safe, for vest pocket; Patent Indelible Pencil. Warranted, &c. Satisfaction given or money refunded. Address (with stamp) RICE & CO., 83 Nassau street, N. Y. 1*

STEAM GAGES.—PRICES VARYING FROM $10 TO $30. Old Gages repaired and exchanged for new and improved ones. JOHN ASHCROFT, Agent, 18 2* No. 50 John street, New York.

NONPAREIL WASHING MACHINE.—THIS Machine must take precedence of all other machines now in use, being the only one justly entitled to be considered as constructed on correct mechanical principles. Machines and State and county rights for sale by OAKLEY & KEATING, 73 South street, New York. 15 3m

HARRISON'S GRIST MILLS—20, 30, 36 AND 48 inches diameter, at $100, $200, $300 and $400, with all the modern improvements. Also, Portable and Stationary Steam Engines of all sizes, suitable for said mills. Also, Bolters, Elevators, Belting, &c. Apply to S. C. HILLS, No. 12 Platt-street, New York. 1 e3w

FOR FREE DISTRIBUTION.—A PRACTICAL TREAtise on the Incrustration of Steam Boilers ; its causes and effects-its removal and prevention without injury. Address, H. N. WINANS, Box 6, New York P. O. 1*

PORTABLE STEAM ENGINES—6, 8 AND 10-HORSE at $500, $625 and $780. For sale by S. C. HILLS, No. 12 Platt street, New York. 2e3w

NEW YORK OBSERVER FOR 1862.—IN ASKING the aid of all who may desire to extend the circulation of the *New York Observer*, it is proper for us to state distinctly the position it occupies with reference to the present condition of public affairs in our beloved country.

Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold

1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.
2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.
3. That every citizen is bound to support the Government under which he lives, in the struggle to reestablish its authority over the whole country.
4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

The distinctive features of the *Observer* are,

1. It is printed on a double sheet, so as to make two complete newspapers, one devoted to secular and the other religious matters; and these may be separated so as to make two complete journals, while the price for both is no greater than is charged for many papers smaller than either one of the two.
2. It gives every week a complete synopsis of the most interesting events in all the denominations, including those that are called Evangelical and those that are not; as every intelligent Christian wishes to be well informed respecting all of them.
3. It gives a well-digested epitome of the News of the Day, Foreign and Domestic, prepared with great labor and care, so that the reader is sure to be put in possession of every event of interest and importance to the public.

The foreign correspondence of the *Observer* is unrivaled, and has long commanded the admiration of intelligent men.

TERMS FOR NEW SUBSCRIBERS.

1. To each new subscriber paying in advance $2 50 for one year, we will send the paper and a copy of our Bible Atlas, with five beautiful colored maps.
2. To the person obtaining subscribers we will give $1 for each new subscriber paying $2 50 in advance.
3. To any person now a subscriber sending us one new subscriber and $4 we will send both papers for one year.

Specimen numbers of the *New York Observer* will be sent gratis to any address that may be forwarded to us for that purpose.

The state of the country renders it important for us and esirable for the churches, that a new and earnest effort e made to extend the principles of good government nd sound religious truth into all the families of the land. In every neighborhood there must be some who do not now take a religious newspaper, and who might with a little exertion be induced to subscribe.

SIDNEY E. MORSE, JR., & Co.,
Editors and Proprietors,
tf. 37 Park Row, New York.

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THE MOST DESTRUCTIVE CANNON PROJECTILE yet.—One half interest to any one who will pay the patent expenses. Address F. S. C., Boston, Mass. 17 4*

BRASS LIFT AND FORCE PUMPS, SHIP PUMPS, Steam Whistles, Gage Cocks, Oil Cups, and every variety Brass-Work used by engine builders, manufactured by HAYDEN, SANDERS & CO., 84 Beekman street, New York. 14 13*

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9 tf GUILD, GARRISON & CO.

IRON PLANERS, ENGINE LATHES, AND OTHER MAchinists Tools, of superior quality, on hand and finishing, and for sale low; also, Harrison's Grain Mills. For descriptive circular, address NEW HAVEN MANUFACTURING CO., New Haven, Conn. 1 26

PUMPS! PUMPS!! PUMPS!!!—CARY'S IMPROVED Rotary Force Pump, unrivaled for pumping hot or cold liquids. Manufactured and sold by CARY & BRAINERD, Brockport, N. Y Also, sold by J. C. CARY, No. 2 Astor House, New York. 14tf

MACHINE BELTING, STEAM PACKING, ENGINE HOSE.—The superiority of these articles, manufactured of vulcanized rubber, is established. Every belt will be warranted superior to leather, at one-third less price. The Steam Packing is made in every variety, and warranted to stand 300 degs. of heat. The Hose never needs oiling, and is warranted to stand any required pressure; together with all varieties of rubber adapted to mechanical purposes. Directions, prices, &c., can be obtained by mail or otherwise at our warehouse. NEW YORK BELTING AND PACKING COMPANY.
JOHN H. CHEEVER, Treasurer,
14 13 Nos. 37 and 38 Park-row, New York.

FOR SALE OR EXCHANGE FOR A SMALL PLANER, a Milling Machine, for gun or similar work, of the best make, nearly new, and in complete order. WOOSTER & GLOVER, Birmingham, Conn. 16 3*

ALBANY IRON WORKS, TROY, N. Y.—SEMI-STEEL Plates and Forgings.—We are prepared to furnish forged shapes of this approved metal, and without unnecessary delay, having large facilities for production. Among the uses to which this material is now applied, and with great success, we name, rifled cannon for government use ; also rifle and musket barrel shapes, locomotive engine tires, locomotive engine axles, straight and crank, car axles, crank pins, plates for locomotive fire box, flue sheets, &c. It is peculiarly adapted for shafting, indeed, for all purposes where strength and rigid qualities are required, its tensile strength ranging from 90,000 to 118,000 lbs. to the square inch, nearly double that of the best iron.—Cast-steel forgings up to 1,500 lbs. each, likewise furnished. Communications addressed to CORNING, WINSLOW & CO., A. I. Works, Troy, N. Y., will be promptly responded to. Parties at the West can be supplied on addressing their orders to A. S. WINSLOW, Cincinnati, Ohio. 15 6m*

ALCOTT'S CONCENTRIC LATHES—FOR BROOM Hoe and Rake Handles, Chair Rounds, &c.—Price, $25; and a other kinds of Wood-working Machinery, for sale by
8*1em S. C. HILLS, No. 12 Platt-street, New York.

SOLID EMERY VULCANITE.—WE ARE NOW MANUfacturing wheels of this remarkable substance for cutting, grinding and polishing metals, that will outwear hundreds of the kind commonly used, and will do a much greater amount of work in the same time, and more efficiently. All interested can see them in operation at our warehouse, or circulars describing them will be furnished by mail.
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Improved Undulating Spring Bed Bottom.

The accompanying engravings represent one of the simplest spring beds that has yet been invented. Fig. 1 represents the bed when placed upon the bedstead; Fig. 2 shows the form the slats assume when the bed is in use. All the elasticity of the bed is derived from the slats. The novelty of the invention consists in placing a fulcrum bar, *a*, near the foot of the bed, in connection with a sliding rest for the slats at the upper or head end. These sliding rests consist of smooth metallic rods fastened to the ends of the slats, and passing into the head rail, *b*. The rods are secured from drawing entirely out by heads upon their inner ends too large to pass through the holes in a thin plate or strip of wood attached to the side of the rail, *b*, into which holes the rods enter for support. The slats act independently of each other, and assume an undulating form when the bed is in use, as shown in Fig. 2.

Fig. 2.

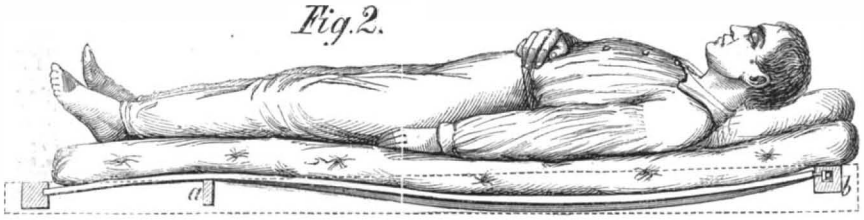
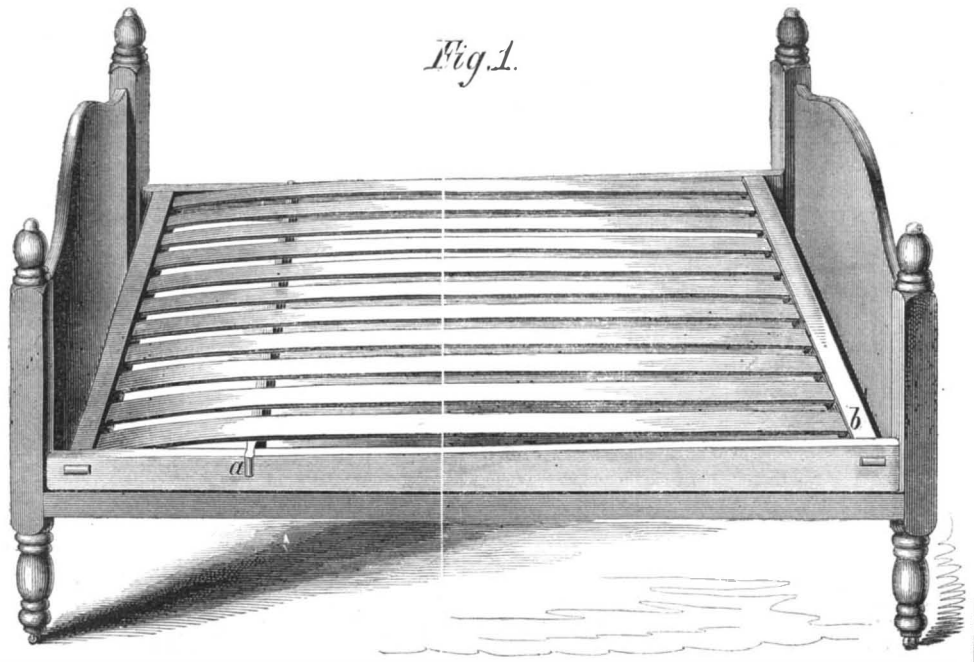


Fig. 1.



TUCKER'S SPRING BED BOTTOM.

The above described bed has been patented and introduced both in France and England, and is much approved of by those who have seen and used it. Measures have been taken to secure a patent in the United States. Manufactured and for sale by Hiram Tucker, Cambridgeport, Mass.

The Opium Shops of Java.

What spirituous liquors are for the European, opium is in Java for the Mohammedan and Chinaman. A European of the lower classes may sit in his tap-room and debase himself by his sottishness; but he does it with an uproarious merriment which would make one think he was really happy, spite of the headaches and *delirium tremens* he may know are in store for him. But in an opium hell all is as still as the grave. A murky lamp spreads a flickering light through the low-roofed sufficating room in which are placed rough wooden tables, covered with coarse matting, and divided into compartments by means of bamboo-reed wainscoting. The opium smokers—men and women—lost to every sense of modesty, throw themselves languidly on the matting, and, their head supported by a greasy cushion, prepare to indulge in their darling vice.

A small burning lamp is placed on the table, so as to be easily reached by all the degraded wretches who seek forgetfulness or elysium in the fumes of opium. A pipe of bamboo-reed, with a bowl at one end to contain the opium, is generally made to do service for two smokers. A piece of opium, about the size of a pea, costs sixpence (a day's wages); but it is sufficient to lull by its fumes the senses of the smoker. These fumes they inhale deliberately, retaining them in the mouth as long as they can, and then allowing them gradually to exhale through their nostrils. After two or three inhalations, however, the opium is consumed, and the pipe falls from the hand of its victim.

At first the smokers talk to each other in a whisper scarcely audible; but they soon become still as the death. Their dull sunken eyes gradually become bright and sparkling—their hollow cheeks seem to assume a healthy roundness—a gleam of satisfaction, nay of ecstasy, lightens up their countenance as they revel in imagination in those sensual delights which are to constitute their Mohammedan paradise. Enervated, languid, emaciated, as they are in fact, they seem and feel for the time regenerated; and though they lie there the shameless and impassive slaves of sensuality and lust, their senses are evidently steeped in bliss. Aroused, however, from their dreams and delusions—the potency of the charm exhausted, driven from their "hell" by its proprietor—see them next morning walking with faltering step, eyes dull as lead, cheeks hollow as coffins, to their work.

Necessity the Mother of Invention.

A correspondent of one of the daily journals writing from camp says:—The need of protection against sudden cold has set the inventive wits of our Yankee soldiers to work. A plan was soon hit upon. This is the description of it:—A hole is dug in the center of the tent, two feet in depth and diameter. This is walled with stones laid in soft clay, and covered at the top with the exception of a small aperture for the introduction of fuel. For this aperture there must be a close-fitting door or cover, which can be opened and closed at pleasure. Across one side of the tent a trench is laid and covered with wood and earth through which the cold air is conveyed freely to the bottom part of this subterranean fire place. From the top of the same and across the opposite side of the tent, another trench is laid and carefully covered with stone and earth, through which the smoke and surplus heat is carried off. This is the whole machine. The merits of it are obvious. It is universally practicable. It can be introduced easily into any tent or dwelling. The economy of it costs only a few hours' work for three or four men. The convenience of it being entirely under ground it takes up none of the precious room of our small tents. The utility of it: it dries and warms the earth within, and even beyond the entire circuit of the tent, and thus prevents those damp, cold and unhealthy exhalations from the earth which are probably the chief cause of the ill health among soldiers. The tents are thus also furnished with a moist and genial atmosphere, the heat of which can be easily increased so as to meet the exigencies of the coldest part of the season. To realize the importance of this you must remember that the walls of our houses are only thin canvas—that they are so readily penetrated by cold, or heat or moisture, that the atmosphere within follows rapidly the changes in the condition of the atmosphere without. Indeed, so far as this is concerned, there is but very little difference between living under the tents and in the open air. Without some such contrivance what, therefore, could persons do, who, until within a short time, have been accustomed to live in close and warm houses.

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